I IRONSTONE

DRAGON USER

The independent Dragon magazine

95p US$3.25 April 1986



"A BIG IMPROVEMENT ON OS-9"

DRAGONPLUS — The best way to improve your Dragon OS-9 system at one stroke and continue to run all your existing software. Just run GO80 and get a fast professional 80 by 24 display as well as reclaiming the 6144 bytes of valuable user RAM taken by GO51. Loading the VDISK driver and the VO device descriptor gives a 240 sector RAMDISK which can be used in many different ways to speed up assemblies, compilations, file copying, loading big programs etc . . . especially useful if you only have one disk drive. Simple changes to STARTUP allow OS-9 to be automatically started with the 80★24 display and RAMDISK.

OS-9 Drivers for DRAGONPLUS — only **£5.75**

A BIGGER BETTER DRAGON

Upgrade your DRAGON with our DRAGONPLUS expansion and add an extra 64K of memory and a fast professional full size 80 by 24 video display with its own 2K video RAM. DRAGON 32s must be upgraded to 64K memory (upgrade service available).
Software now available for OS9, FLEX, DRAGON DOS and on cartridge.

Assembled and tested (please state DRAGON 32 or 64)	£103.50
Update disk for FLEX (with 80X24 and RAMDISK)	£5.75
EDIT+ cartridge for DRAGONPLUS	£15.00
EDIT+ disk (DRAGON DOS)	£19.95
SPECIAL OFFER — DRAGONPLUS with FLEX/EDITOR/ASSEMBLER/DBASIC/EDIT+	£199.99

FLEX is BEST

We make no secret of our support for FLEX (0★9 fanatics may skip this paragraph). It's one of the most friendly and easy to use operating systems and has been popular with 6800 and 6809 users for many years. Our implementation on the DRAGON has autorepeat, 51 by 24 Hi-Res text screen with windows, true lowercase, redefinable character sets and still leaves a full 48K of memory free for programs and data and happily uses 40 or 80 track disks, single/double sided, single/double density.
It comes complete with a powerful text editor and one of the best 6809 assemblers available and gives you access to lots of good professional software.

Available for DRAGON DOS, DELTA DOS or CUMANA DOS 2.0	£86.25
Special Offer: FLEX/ED/ASM with DBASIC	only £99.99

DBASIC — DRAGON BASIC for FLEX

No you don't have to throw away or rewrite your BASIC programs when you move up to FLEX. Just start DBASIC and the DRAGON will run standard DRAGON BASIC programs and machine code tape programs. But that's not all — you can load/save programs, read/write data on FLEX disks, use the HIRES screen, send commands to FLEX. And there's a clever ERROR command that shows you exactly where your program went wrong. With 5 example programs plus a very useful cheque book balancing program donated by one of our satisfied customers.

DBASIC for Compusense DRAGON FLEX — **£30.00**

SP-EDIT — Wordprocessor with Interactive Spelling Checker

A friendly yet powerful full screen editor and wordprocessor. Turns your DRAGON into a wordprocessing system which shows you how the text will appear on the page and checks your spelling too. Ideal for writing anything from letters to books as well as programs. Automatic on-screen formatting, underline, bold, italics, superscript, subscript. Left/Right scroll for documents wider than screen. Complete with a 10,000 word dictionary (with utilities to modify the dictionary). Ready configured for DRAGON/DRAGONPLUS or Hazeltine 1500 Terminal and most printers — easily configured for other terminals and printers. Includes the BROWSE file display utility.

SP-EDIT for FLEX — **£75.00**

EDIT+

A must for every DRAGON owner. Gets you out of the rut of the 32 by 16 screen and the limited EDIT command. Allows BASIC to work with a 51 by 24 Hi-Res Screen and edit your programs with a full screen editor and comprehensive programmer's toolkit.

EDIT+ cartridge	£34.45
EDIT+ disk (DRAGON DOS)	£19.95
EDIT+ disk (for DRAGON FLEX/DBASIC)	£19.95

CROSS ASSEMBLERS FOR FLEX

For 6800/2 6801/3 6301 6805 6502 8080 Z80 — 6811 and 64810 available soon. All the features of the excellent FLEX 6809 assembler — from **£51.45** each

MXT REAL TIME CONTROLLER

Interface your DRAGON 32 to the real world — 4 switch inputs — 4 outputs and a real time clock. 2 relay version **£29.95**. 4 relay version **£36.95**

PRINTERS

QUENDATA 20 cps daisy wheel **£205.85** — CPA 80+ NLQ matrix **£228.85**
Full range available — from typewriters to laser printers

CHATPLUS PLUS !!!! or CHATPLUS 2

Our resident communications expert has added even more features to our CHATPLUS communications program making it THE BEST MODEM PROGRAM for FLEX and soon for OS-9. Use CHATPLUS 2 to communicate with other computers, electronic mail and bulletin boards eg. ONE TO ONE, TELECOM GOLD, EASYLINK, PRESTEL (300 baud) and for OU students to send E-MAIL/TELEX/etc . . . Features include:

1) Autodial VOICE and DATA calls with suitable modems eg VOYAGER/DEMON
2) Autosetup of baud rate, parity/data bits
3) On-line directory of phone numbers and setups
4) 51 by 24 display or 80 by 24 with DRAGONPLUS
5) Off-line file preparation — transmit documents/files with a few keystrokes
6) Buffered and interrupt driven for speed and efficiency
7) Support XON/XOFF on transmit and receive
8) Supports buffer control codes for upload and download
9) Any length file may be uploaded
10) Any length file can be downloaded — direct to disk by using the optional XON/XOFF protocol
11) Set any baud rate 50 to 19200 bps
12) Half-duplex split speed possible eg 1200/75
13) Toggle between popular bulletin board speeds and setups
14) Set number of data bits 5/6/7/8
15) Set parity: none,odd,even,mark,space
16) Password protection — stops your passwords being displayed on screen
17) Full documentation and user support
18) Define Answerback for autologon
19) Optionally view data received in HEX format for debugging etc.

CHATPLUS 2 only **£24.95** for FLEX — call for availability for OS-9

★★★ NEW ★★★ CHAT/Viewdata for the DRAGON 64 ★★★ NEW ★★★

Access PRESTEL and Viewdata format bulletin boards at 1200/75 with full GRAPHICS (but not colour) using your DRAGON64 and a V23 modem. Screens may be saved and received offline.

Cassette **£9.95** — DRAGON-DOS **£14.95** — FLEX **£14.95**
DEMON MODEM + cable + cassette only **£84.00** — with DRAGON DOS/FLEX disk **£88.00**

CHATBBS

START YOUR OWN BULLETIN BOARD — call 01-882 8128 for a demonstration

MODEMS for the DRAGON 64

NEW! NEW! The VOYAGER 7 and VOYAGER 11 modems are low cost and high quality multi-standard modems with full BT approval, autodial and autoanswer capability, V21(300/300) and V23(1200/75) originate and answer. The Voyager 11 has a professional 25 way D-connector interface to full CCITT V24 and upgrade options eg. Autoband rate scan, Full Buffering, Hayes Compatibility, V22, 110 volt/battery operation.
DEMON MODEM — autodial autoanswer V21/V23 BELL102/202 not BT approved. Works well with CHATPLUS. Excellent value and performance at a bargain price.
THORN VX543 intelligent modem — autodial autoanswer with speed match buffer V21 and V23 (originate only) — can be used with many computers and terminals

VOYAGER 7	£91.95	cable £9.50
VOYAGER II	£114.95	cable £13.50
DEMON	£69.00	cable £9.50
THORN EMI VX543	£195.00	cable £13.50

many other modems available
CALL for advice and special offers on modem/cable/software packs
Modems and software available for a huge range of home and business computers

ACCESSORIES

Best quality DUST COVER for DRAGON 32/64	£2.99
DUST COVER for DRAGON DISK DRIVE	£2.99
CENTRONICS PRINTER LEAD	£14.99
MONITOR/SOUND LEAD (DIN to two PHONO plugs)	£3.99
GREEN SCREEN MONITOR with sound includes cables and delivery	£99.00
AMBER SCREEN MONITOR with sound includes cables and delivery	£104.00
5 ¼ inch DISKETTES double sided double density	10 for £13.50
The Floppy File — store 40 diskettes in one A4 binder	only £14.00
★★ special offer ★★ diskettes 10 for **£11.50** (max 40) when you buy a Floppy File	
DRAGON 32 Manual — Limited supply	£1.50
INSIDE THE DRAGON — essential inside information — limited supply	£7.95
	plus postage £1.50

SPARES AND SERVICE

★★★ BRAND NEW DRAGON POWER PACKS ★★★ GUARANTEED ★★★
£16.00 includes postage

POWER SWITCHES for the DRAGON 64 (and some 32s)	only £1.50
SAM CHIP (74LS783 — MC6883)	only £25.00
UPGRADE DRAGON 32 to 64K	from £40.00
DRAGONDOS disk controller repair/exchange	£35.00
Repairs to DRAGON 32/64/DISK DRIVES please call	from £25.00
DRAGON DOS Version 4 ROM	£5.75

DRAGON HARDWARE

DRAGON 64	£195.00
2ND DRIVE UPGRADE KIT FOR DRAGON DISK SYSTEM	£105.00
Complete Disk drive systems for the DRAGON from	£204.95
720KB — 80/40 switchable double sided add-on drive with own PSU	only £154.95
Call for advice and best prices on disk drive systems and disk controllers	
10 MEGABYTE HARD DISK as demonstrated at 6809 COLOUR SHOW	please call
EXPANSION SYSTEM — allows 4 cartridges to be plugged into the DRAGON under software control	£148.00
RS232 AND I/O INTERFACE — uses the 6551 and 6522 VIA — with comprehensive software in ROM	£63.00
MODEM CABLE for RS232 INTERFACE to standard modem (D connector)	£19.95
EPROM PROGRAMMER — handles most single rail EPROMS including 2764/27129 and 27256 software	£78.00
for using EPROM programmer/expansion system with FLEX	please call
SIDEWAYS ROM — holds 4 banks of ROM with up to 58K of programs (in BASIC or Machine Code)	£45.00
PROTOTYPING BOARD	gold connectors £9.00
PROTOTYPING BOARD	tin connectors £7.00
PLASTIC CASE FOR PROTOTYPING BOARD	£3.00

Prices and specification subject to change without notice
PRICES INCLUDE VAT

DEALER AND EXPORT ORDERS WELCOME — POSTAGE AT COST

★★★ fast mail order service ★★★

COMPUSENSE SALES-LINE	01-882 0681
COMPUSENSE HELP-LINE	01-882 6936
COMPUSENSE ON-LINE **bulletin board**	01-882 8128
300 baud 8 data bits, 1 stop bit no parity	

COMPUSENSE

BARCLAYCARD VISA

COMPUSENSE LTD
PO Box 169, 286D Green Lanes
London N13 5XA
Tel: 01-882 0681/6936
Telex: 8813271 GECOMSG
ONE TO ONE MBX 1709 8001

POSTAGE & PACKING £1 PER ORDER
DRAGON 32/64 £5.00



Telephone number
(All departments)
01-437 4343

Editor
JOHN COOK

Production Editor
BARBORA HÁJEK

Software Editor
GRAHAM TAYLOR

Editorial Secretary
LUCINDA LEE

Advertisement Manager
SIMON LANGSTON

Administration
GERALDINE SMYTH

Managing Editor
PETER WORLOCK

Publishing Director
JENNY IRELAND

Subscriptions
UK £14 for 12 issues
Overseas (surface) £20 for 12 issues

ISSN 0265-0177. Telex: 296275
Dragon User, 12/13 Little Newport Street, London WC2H 7PP

US address: c/o Business Press International, 205 East 42nd St, New York, NY 10017

ABC

Published by Sunshine Books, Scot Press Ltd.
Typesetting by Chesham Press, Chesham, Bucks. Printed by Greenaway Harrison (Southend) Ltd, Southend-on-Sea, Essex
Distributed by S.M. Distribution, London SW9. 01-274 8611. Telex: 261643
Registered at the Post Office as a newspaper

How to submit articles
The quality of the material we can publish in *Dragon User* each month will, to a very great extent depend on the quality of the discoveries that you can make with your Dragon. The Dragon computer was launched on to the market with a powerful version of Basic, but with very poor documentation.

Articles which are submitted to *Dragon User* for publication should not be more than 3000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should, whenever possible, be computer printed on plain white paper and be accompanied by a tape of the program.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

Contents



Editorial

ORDERING goods by mail has always been a bit of a strange business. For a start, apart from the massive glossy household catalogues, the range of goods available via this strange transaction always seem to be — well — a bit out of the ordinary. Take a look at the classified ads in your Sunday newspaper. Whalebone corsets, Toupees and X-Ray specs . . . hardly run of the mill. Plus, if you think about it, the actual act of faith in sending some money off to a strange address and hoping something will come back seems on a par with expecting trains to run on time, or England to beat the West Indies. And when it does arrive — is it really what you wanted in the first place?

Luckily for us, actual crooks are very few and far between in the computer market, but as recent events have shown, delays that drag on for weeks and months cause unnecessary worry, are downright frustrating and (worst of all) cause a lack of confidence in the system that hits every company — good and bad. So what can the consumer do?

You can always read the reviews in Dragon User of course, but this is the area where shows come into their own. At a show, you can meet the people behind the companies. Look at the goods and form your own opinions, chat to other users. Even if you can't make it to a show physically, you can bet that if someone is exhibiting regularly, then they are run by enthusiastic, active Dragon supporters.

So, if there's a show near you, why not pay it a visit. In fact, you'd be daft not to. As the lawyers say, 'Let the buyer beware'.

If you have any new products for the Dragon — software or hardware — ring the News Desk on 01-437 4343

South Wales success

THE 'Dragon comes home to Wales' show, held on 15th February in Cardiff, was by all accounts quite a success — with a total attendance of around 700. Trade supporters included Blaby, Compusense, Computape, Datapen, Grosvenore, John Penn, Pamcomms and Peaksoft. "Everyone that came seemed happy," said organiser John Penn, "and we've already had quite a few nice letters." The event generated a great deal of interest — with people coming from as far away as Birmingham — and coverage from GWR Radio and the Western Mail.

So much so, in fact, that a repeat performance is already in the advanced planning stage — this time to be held in the Leeds area, in the middle of May.

But in addition to the usual trade exhibitors, John is hoping to encourage users to come along and actually show the public what varied uses they can put to. "Radio communications, Model train controllers, that kind of thing," explained John. "We're trying to show people what can be done with their computers." He added, "We're continuing to support the Dragon in every way we can — trying to bring in all aspects of Dragon use — not just a roadshow."

Anyone who feels they have a project that might be of interest, contact John Penn on Bordon (04203) 5970.

Eclipsed

FOLLOWING coverage of delays re the game Total Eclipse (Dragon User March 1986), West Midlands Consumer services were inundated with calls from disgruntled readers. Although at the time of going to press, Eclipse were unavailable for comment, reports were coming in of the arrival of the game from all over the country. As soon as our copy arrives, expect a full review. Watch this (empty) space.



Extra!

NEWS that will interest potential purchasers of Quickbeam's Shaolin Master — the game now has an extra bonus, a 'Challenge Screen' between bouts — but don't worry if you've already bought it. Quickbeam's Dave Hitchman is offering the upgrade to existing owners just for the postage. Send your tape back to them with the appropriate number of stamps and you'll get your upgrade, for no extra charge.

For first time purchasers, the price remains at £7.95 plus 50p P&P. Contact Quickbeam Software, 67 Old Nazeing Road, Broxbourne, Herts EN10 6RN.

Hold the Bus!

ANDTEK Data Design are now offering a BUS Expansion available to the Dragon or Tandy colour computer user. Called Addbus it consists of a Buffer cartridge, and a compact, six slot, Expansion Unit. Cartridges can be mixed with Disk Interfaces, or used simply as a peripheral I/O Expansion Bus. The user is offered the choice of cartridge selection, from a digital switch, or under software control, either from cartridge or local program. Additionally an 8 bit I/O parallel Port configured as a Centronic Printer Interface is a standard in-built feature.

Andtek's future plans include the release of an 80 column card, ROM Disk Card, and RAM Expansion, all with the enthusiastic upgrader in mind.

Addbus is offered as a set of P.C.B's, cartridge case, and constructors/operators manual, at £38.00. Also available fully built, and tested. For full details, please write to; Andtek Data Design, 41 Pebworth Road, Harrow, Middlesex HA1 3UD.

Now Showing

YET more show news, this time from Microdeal, who are holding two 6809 Conventions, one in London in November, and one at CMIST in Manchester, to be held over the weekend of April 5th and 7th.

Apart from trade exhibitors (already 12 in number) a major feature of the convention will be a series of lectures (three per day) covering various aspects of 6809 computing, supported by a panel of experts to service extended question and answer sessions after each lecture. Microdeal are also throwing open the doors to any user groups or adventure clubs that want to use the facilities. Entrance is expected to be £1.75 for adults, 75p for children. Said spokeswoman Jennifer Pope, "We're expecting to take Manchester by storm!"

For further details about accommodation, venue and availability of club space, contact Jennifer on (0726) 68020, or write to Box 68, St Austell, Cornwall PL25 4YB.

Weekend away in Wales

IF YOU'RE still thinking about going to the Dragon 'Weekend in Wales' (see Dragon User Feb 1986) at the end of this month, you'd better make your mind up soon! Says event organiser Bob Morgan, "Bookings are going very well, but some places may still be available. We're looking forward to an exciting weekend." Bob is particularly looking for a few more experienced OS-9 users, so if that's your cup of tea, why not give it a try?

The event is to be held at the Trefeddian Hotel, Aberdovey in Gwynedd over the weekend of 21-23rd, with a variety of talks and demonstrations planned — including an appearance by our very own Brian Cadge on the Saturday.

The cost, fully inclusive of accommodation and board will be £45 per person. Interested parties contact Bob at the Mid Wales Tourism Council on 0654 2654.

Black Box

UNTIL recently, the major problem with converting joysticks for the Dragon has been that the actual conversion, no matter how careful, automatically invalidates the manufacturers warranty. However, those clever Peaksoft people have come up with a remedy, in the shape of a little black box, called the Dragoniser. The box just plugs in between the unconverted 9-pin Atari-type joystick and your computer — it's as simple as that . . .

Initially, Peaksoft will be supplying the Dragoniser only with the Quickshot II Autofire joystick — at an inclusive price of £14.95.

Contact Peaksoft at 48 Queen Street, Balderton, Newark, Notts. Tel (0636) 705230.

Communication

Send in you questions, requests, and pleas to Communication, Dragon User, 12-13 Little Newport Street, London WC2

Problem I have aquired a copy of Speculator (Radio Shack for Tandy Co-Co), a spreadsheet in cartridge form. Is there any way I can get it to perform on my Dragon 32? I have no instructions for it, and every time I start it, I get the spreadsheet layout and an entry request. Pressing keys registers a very slow response, but I am unable to transfer data from the entry line to the spreadsheet. The Enter key generates a command error message. Can anyone help? Alternativly, is there a good spreadsheet or Database available on cartridge?
Enquirer Robert Brown, ISD, 17 Antrim Road, Lisburn, Co Antrim BT28 3AL.

Problem Pokes or routines required to disable List, Break key and Reset Button.
Enquirer Alan Burton, 11 Ingaway, Basildon, Essex SS16 5QR.

Problem Please help a Spanish boy who will be in your country six months. Where can I find a Dragon available to use or rent in London?
Enquirer Angel Vicente, 55 Riverside Gardens, King Street, London W6.

Problem Sometimes when I try to load a program the cursor dissapears too soon and the program does not load. Could you please help me?
Enquirer David Paton, 8 Ardoch Park, Glenrothes, Fife KY6 3PT.

Problem I am searching any literature (books, issues) concerning the Dragon (tips, games) plus back issues of Dragon User: all 1983 and before, 1984 January, April, June. Can anyone help?
Enquirer Lemaire Jacques, Rue Patenier, 46 B5000, Namur, Belgium.

Problem I can't get my Super Dragon Writer to drive a serial printer on my Dragon 64 via the serial port (Dragon Data Cartridge). Help please.
Enquirer Mathew Lodge, Maen Melin, Holmes Chapel Road, Lach Dennis, Northwich, Cheshire CW9 7SZ.

Problem Last Christmas I received a Touchmaster graphpad. After a lot of work, I eventually got my Cumana DOS Cartridge to fit into the Touchmaster expansion port, but to no avail.

When I use the multipaint program and try to save the graphics on disc, I get an FD error (Directory Full). Please can anyone tell me how I save these graphics on my Cumana Disc Drive?
Enquirer Andrew J. Golledge, Robin Hood Cottage, Pinfold Lane, Northop Hall, Nr Mold, Clwyd CH7 6HE.

Problem Is it possible to link a Dragon 32 to a EBSO/Centronics computer printer and use Dragon commands?
Enquirer James P. O'Connell, 8 Colombo Crescent, Weston-super-Mare, Avon BS23 4QA.

Communication

Stuck for a routine? Need some obscure equipment? Feeling cut off? Fear not — someone, somewhere can help you! Write down your problem on the coupon below (make it as brief and legible as possible) together with your name and address and send it to Communication, Dragon User, 12/13 Little Newport Street, London WC2H 7PP. We'll publish it as soon as we can — meanwhile, maybe there's someone you can help this month!

Problem..

....

Name ....

Address..

....

Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters Page, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

OS-9 Update

I WAS rather surprised at the reply by Paul Grade to my original letter about forming an OS-9 User Group, as I had actually written to Paul, explaining to him that I did not intend to set up a rival group to the DUG. Our group are purely concerned with OS-9; we are not trying to compete with any other group, but rather to fill a void for OS-9 users.

Since my letter in October, we have successfully set up the group and we now produce a newsletter on Disk. The Newsdisk supports a Public Domain Software library as well as the usual letters, articles, new and other items you would expect in a newsletter.

Our members are of all ages and come from many walks of life, with quite a number who are professionally involved in computing and are able to offer assistance to others. Our membership is mainly in the UK but we have two members in Belgium and three in Germany. We are hoping to affiliate with the US User Group in the States and thus broadening both Group's software libraries.

Our Public Domain Software Library currently has one volume (disc) completed, with another half completed. Because we distribute the PDL programs on the Newsdisk every month, our members are able to keep up to date with the PDL programs and of course, it is very much more efficient for contributions coming in. We have some excellent routines which range from disassemblers to communications, file maintenance to utilities and we also have a patch to customise Stylograph and use it with an 80 (or any size) column terminal.

Our membership fees will be £10 per year which will include the price of the first disk. Then members are asked to send in the disk by the 20th of the month for the next issue. We currently have three newsletters (2 disk issues) and the 3rd Newsdisk will be due at the end of February. If anyone is interested in joining us, then they only have to send me some blank disks for copies of the Newsdisks which will tell them more about us than a single letter can (return postage would be appreciated).

I would like to thank Dragon User, the Systems Engineers dept of Motorola in Scotland, Ted Opyrchal of Compusense, Drew Crane of Microware, Vivaway, Touchmaster and all the members who have helped me in various ways, whilst I was starting the group.

Martin Vernon
4 Roseberry Court
Llandudno
Gwynedd

Transform

THERE SEEM to be thousands of Dragon users transformed into ex-Dragon users by their transformers burning out. If this happens this is what you should do:

1 Take your faulty transformer into a radio repair shop.
2 Tell them to open it up by drilling out the rivets. (This is usually where the repair people get reluctant, but remember: what have you got to lose?)
3 Let them replace the fuse that has blown, most often the 12V one; usually, the actual transformer is in a beaming state!
4 Let them close the box with screws; the next repair will be so much easier!

DON'T try this yourself unless you're a professional. 240 volts is a killer. The whole job should take about half an hour and not cost more than £10.

PS If anyone is looking for Swedish/Finnish word processing software or software to access and download from electronic mailboxes, contact me!

Martin Vermeer
Punahilkantie 4 B 14
SF — 00820
Helsinki
Finland

MANY THANKS for all the letters on the subject of transformers — the moral is that they can be repaired BY PROFESSIONAL, COMPETENT PEOPLE. The mailbag strongly advised against amateur meddling — a point that cannot be made strongly enough.

Of course, new or reconditioned transformers are now available from a number of sources — Blaby and Peaksoft to name but two.

Wordproc Pokes

I HAVE had a couple of letters from people wishing to use my "Wordproc" program with a printer other than my Seikosh GP100A. The alterations are moderately simple.

Double = code for double width print
Single + = code for double width cancel or single width/ standard select.

POKE &H1185, DOUBLE
POKE &H118B, SINGLE
POKE &H11CB, SINGLE
POKE &H11E2, SINGLE
POKE &H11E9, DOUBLE
POKE &H11F7, DOUBLE
POKE &H11FB, SINGLE

The codes for double and normal text can be entered using the "special characters" key as described in the article. Double spaced lines can be obtained by first loading the program, and then entering: POKE &H14A,2:POKE &H14B, 13:POKE &H14C,13. This will send an extra line feed to the printer each time.

Peter Whittieker
Cambridge

Tip Time

THIS IS the first letter that I have written to Dragon User so let me say what a great job you're doing keeping the Dragon 32-64 alive.

I have come across a routine of Poke's from Dragon World that might be of some use to the Dragon owners who have (or have access to) a printer.
POKE &H168,&H80 (enter)
POKE &H169,&HOF (enter)
POKE &H167,&H7E (enter)
To cancel the routine type POKE &H167,&H39 (enter). To re-start type POKE &H167,&H7E (enter). What this routine does is that everything that is typed to the screen is sent to the printer, (rather like a typewriter).

Also I am looking for a computer pen-friend who would be interested in programming and also exchanging hints, pokes, programs, etc.

John Scullard
12 The Mount
Teignmouth

More Tips

MY TIP is, if you are like me and messing with machine code sometimes the program goes wild and usually its DragonDos that gets the worst end of the stick. To get it back just run this little program.

```
10 CLEAR 600
20 FOR A=1 to 1B
30 SREAD 1, 16, A, A$, B$
40 SWRITE, 20, A, A$, B$
50 NEXT
```

Mr R. Bailey (G4PPP)
52 Princess St
Chase Terrace
Staffs
WS7 8JN

Dragon to Dragon

BELOW ARE some good BBSs that cater for us Dragon users with modems. I'll list them with what I think are the best at the top and then in descending order.

Ring back (R/B) means that you dial the number and after it's rung once, you replace the receiver and dial again. When you get the carrier tone, turn your modem on and replace the receiver.

You must ensure that your modem is set in *Originate Mode* or else you'll get garbage on the screen.

All of the above numbers require your software to be set on "7 Bits No Parity 1 Stop Bit.

Ray Thomas
40 Bro Dawel
Solva
Haverfordwest
Dyfed
SA62 6TZ

Name	Number	Details
WABBS (300)	0903 503711	RING BACK. 24 HRS.
BBS09 (300)	0705 736025	R/B. WED & SAT7-10PM SUN, 10AM-10PM. DRAGON BBS OS-9
DARK CRYSTAL	01 954 9847	24 HRS. (300 & 1200).
TUG II(300)	021 444 1484	8AM-10PM, R/B. 10PM-8AM, NORMAL.
SANCTUARY (300)		24 HRS.

Dragon User People's Chart

THIS IS what the Dragon world has been holding its breath for — the results of the first Dragon User People's Chart. The entries flooded in and the administrative minions were kept working long and hard until the results opposite were obtained.

Generally, the anagram attempts were of an amazingly high standard, but in the end we plumped for the solid but sincere, 'The Dragon is just great,' from D J Pott of Chittlehampton, North Devon. Many congratulations to him, and his prize will be winging its way westward very soon. And so to next month . . .

Each month we will be asking you to vote for your top five favourite programs on your Dragon (games, applications or utilities) and write them down in order of excellence on the form opposite (or copy it out if you don't want to damage your issue). And just for an extra incentive (as if you needed it), if you like you can construct a phrase or sentence using letters from the titles in your own top three — you don't have to use them all, just as many as you can. We will pick out our favourite, and he or she will be the recipient of £25 worth of software, donated by Microdeal. You can vote in the chart without making up an anagram, but you won't be in with a chance of winning a prize.

Send off your entry to: People's Chart, Dragon User, 12-13 Little Newport Street, London WC2H 7PP. Enter the People's Chart!

Results February 1986

1 Shocktrooper........................ (Microdeal)
2 Juxtaposition........................ (Wintersoft)
3 Speed Racer........................ (Microdeal)
4 Eddie Steady Go........................ (Incentive)
5 Jet Set Willy .... (Software Projects)

Chart Three

Voting for Chart No. 3 closes at 1pm on Friday 18th April 1986. Entries received after that time will not be eligible for inclusion in that month's voting. The editor's decision is final. Only one entry per individual per month will be allowed.

My top 5: Voting Month 3

1. ....
2. ....
3. ....
4. ....
5. ....

Name ....

Address ....

....

....

....

....

My phrase is: ....

Any Questions?

Construct your own personal expert system with this program from the keyboard of ***Peter Witticker***

IN THE Syllogy Expert program (*Dragon User*, March 1986) I demonstrated how the Dragon could be made to appear to understand English, and to draw conclusions from what it was told. However, interesting though that may be, it is not of much practical use in the real world. The program here presented is different, in that it has great potential use, the extent of which is only limited by the imagination of the user. For example, if your car broke down, it would be possible for the non-expert car mechanic to diagnose the fault in a matter of minutes using this program. The program would ask a series of questions, and depending on the answers given would be able to work out the fault. Similarly this program could help to diagnose an illness or to categorise an unrecognised animal.

Binary

Start by entering and running Listing 1 'Dataspurt'. This is a short expert system which will illustrate some of the principals and weaknesses of such systems. When run, it asks you to choose one of four possible causes for a car breakdown. Then it asks three relevant questions, and depending upon the answers makes its diagnosis. The program works by treating the series of answers given as a binary number (Yes = 1 No = 0), so that at the end of the sequence of questions we have a three bit binary value. This value is compared with the values required for the four known solutions to the problem. If a match is found it is printed out, and the program returns to the start again.

This works quite well, and although the program does not have any inbuilt ability to learn new solutions to the breakdown problem, it can be easily altered. If the questions are all answered 'Yes', the program will reply that it does not know what the problem is. Edit Line 230 to add *"Ignition timing",7* and change the loop in Line 150 from 4 to 5. The program will now come up with a solution to the situation. However, this is a very unsatisfactory solution, because it is difficult to expand the program's knowledge database. With three questions it can distinguish between eight different situations, but if we wish to add a ninth situation we must include an extra question. Doing this will change the answer values for all the other eight answers (from three bit values to four bits) and the database values will need to be recalculated.

This might not be too much trouble with three questions and eight situations, but by the time you have reached 10 questions and over a thousand different situations the job gets out of hand. A second problem is that to find a solution, the program needs to ask all of the questions it knows, even if some of them are totally irrelevant. Added to this many of the possible answer combinations will never occur, so 10 questions might only distinguish between 20 actual solutions, and not the thousand possibilities. All of this makes the program very rigid, uninteresting to use, and removes all chances of a short cut to the solution.

Listing #2, the 'Expert Learning System' overcomes these problems. Instead of relying upon rigid totals for all the questions asked, it generates a tree of related questions and answers. This means that it will ask only the minimum of possible questions to arrive at a solution, and that it can very easily learn and expand its knowledge database. The program makes use of three data tables. The first,

```
10 CLS:PRINT@7,"ANIMAL EXPERT":PRIN
   T:PRINT
20 PRINT:PRINT"PLEASE CHOOSE A BREA
   KDOWN FROM  ONE OF THE FOLLOWIN
   G...":PRINT:PRINT"A FLAT BATERY
   ":PRINT"AN EMPTY PETROL TANK":P
   RINT"A BROKEN HEADLIGHT":PRINT"
   A BLOWN FUSE":PRINT
30 RESTORE
40 '**** ASK QUESTIONS ****
50 POWER=.5:SUM=0
60 FOR A=1 TO 3
70 POWER=POWER*2
80 READ QUESTION$:PRINTQUESTION$;CH
   R$(63)
90 A$=INKEY$:IF A$="" THEN 90
100 IF A$="Y" THENPRINT"YES":SUM=SU
   M+POWER:GOTO130
110 IF A$="N" THEN PRINT"NO":GOTO13
   0
120 GOTO 90
130 NEXT A
140 '**** FIND ANSWER ****
150 FOR A=1 TO 4
160 READ ANSWER$,ANSWER
170 IF SUM=ANSWER THEN PRINT"THE AN
   SWER IS ";ANSWER$:FOR A=1 TO 50
   0:NEXTA:GOTO20
180 NEXT A
190 PRINT"I DO NOT KNOW WHAT THAT I
   S!":FOR A=1 TO 500:NEXT A:GOTO2
   0
200 '*****QUESTIONS*****
210 DATA "DO THE LIGHTS WORK","DOES
    THE ENGINE RUN","DOES THE HORN
    WORK"
220 '*****ANSWERS*****
230 DATA "FLAT BATERY",0,"EMPTY PET
   ROL TANK",5,"BROKEN HEADLIGHT",
   6,"BLOWN FUSE",2
240 (C) 1985 PETER WHITTAKER.
```

Listing 1



FOR
DRAGON AND TANDY OWNERS
5/6TH APRIL
THE ENTRANCE HALL, UMIST, SACKVILLE ST., MANCHESTER

Show Times: Sat 10.00 a.m. — 6.00 p.m.
Sun 10.30 a.m. — 5.00 p.m.

PEAKSOFT
BLABY
DESIGN DESIGN
SHARDS
POCKETMONEY SOFTWARE
MODEM HOUSE
INCENTIVE
TANDY CORPORATION
COMPUSENCE
TROJAN
MICRODEAL
SALAMANDER

LECTURES (both days)
11.00 am 1.00 pm 3.00 pm
GUEST SPEAKERS
+ OUR PANEL OF EXPERTS
AND YOUR QUESTION TIME

USER ASSOCIATIONS, ADVENTURE CLUBS, PEN-PAL GROUPS WILL ALL BE THERE

DON'T MISS THIS OPPORTUNITY

ADMISSION £1.75p ADULTS 75p CHILDREN

ADVANCE TICKET ORDER FORM

Please send me . . . . . . adult tickets @ £1.50
. . . . . . child (under 16) @ 50

I understand these tickets will entitle me to entrance on either one or both days)

Name . . . .

Address . . . . Post Code . . . .

I enclose a cheque*/please debit my credit card no* . . . . *(delete as applicable)

RETURN TO THE ORGANISER, 6809 CONVENTION,
P.O. BOX 68 St. AUSTELL CORNWALL PL25 4YB TEL 0726 68020

```
10 CLEAR10000:DIM ANSWER$(500),QUESTION$(500),ARRAY(500,1)
20 ANSWER=1:QUESTION=0:ANSWER$(1)="FLAT BATTERY":ARRAY(0,0)=-1:INITIALQUESTION$="PLEASE THINK OF A CAR BREAKDOWN."
30 CLS0:PRINT@7,"EXPERT SYSTEM 1.1";:PRINT@103,"BY PETER WHITTAKER";:PRINT@288,"S....SAVE DATABASE.":PRINT"L....LOAD DATABASE.":PRINT"Q....QUESTION DATABASE."
40 A$=INKEY$:IF A$=""THEN 40
50 IF A$="S" THEN 670
60 IF A$="L" THEN 820
70 IF A$<>"Q" THEN 40
80 '*****QUESTIONING*****
90 PRINTINITIALQUESTION$
100 IF QUESTION$(1)=""THEN YN=0:GOTO290'ANSWER ROUTINE
110 FLAG=1
120 PRINTQUESTION$(FLAG);CHR$(63)
130 A$=INKEY$:IF A$=""THEN130
140 IF A$="Y"THEN YN=0:PRINT"YES":GOTO170
150 IF A$="N"THEN YN=1:PRINT"NO":GOTO170
160 GOTO130
170 IF ARRAY(FLAG,YN)>0THENFLAG=ARRAY(FLAG,YN):GOTO120
180 IF ARRAY(FLAG,YN)<0 THEN 290
190 '**** BLANK ROUTINE ****
200 INPUT"OKAY, I GIVE UP. WHAT IS IT?     ";A$
210 A=0
220 A=A+1
230 IF ANSWER$(A)=A$ THEN PRINT"THANK YOU.":ARRAY(FLAG,YN)=-A:GOTO30
240 IF ANSWER$(A)<>""THEN 220
250 ANSWER=ANSWER+1:ANSWER$(ANSWER)=A$
260 ARRAY(FLAG,YN)=-ANSWER
270 GOTO30
280 '**** ANSWER ROUTINE ****
290 PRINT"I THINK IT IS A";
300 A$=LEFT$(ANSWER$(-ARRAY(FLAG,YN)),1)
310 IF A$="A" OR A$="E" OR A$="I" OR A$="O" OR A$="U" THEN PRINT"N":PRINTANSWER$(-ARRAY(FLAG,YN));"." ELSE PRINT:PRINTANSWER$(-ARRAY(FLAG,YN));"."
320 PRINT"IS THIS THE CORRECT SOLUTION?"
330 A$=INKEY$:IF A$=""THEN330
340 IF A$="Y"THEN PRINT"YES.":PRINT"THANK YOU.":GOSUB950:GOTO30
350 IF A$<>"N" THEN 330
360 PRINT"NO."
370 INPUT"PLEASE ENTER THE CORRECT ANSWER";A$
380 '*** STORE FOR NEW ANSWER, FIRST CHECKING FOR ALREADY SAVED.*****
390 A=0
400 A=A+1
410 IF ANSWER$(A)=A$ THEN 440
420 IF ANSWER$(A)<>"" THEN 400
430 ANSWER$(A)=A$
440 AA=A
450 AB=-ARRAY((FLAG,YN):' STORE LOCATION OF OLD ANSWER
460 B$=ANSWER$(AB):' OLD ANSWER
470 ARRAY(FLAG,YN)=QUESTION+1:QUESTION=QUESTION+1:'SET ARRAY POINTER CHAIN TO THE NEW QUESTION
480 PRINT"PLEASE ENTER A QUESTION TO TELL A";
490 IF LEFT$(A$,1)="A" OR LEFT$(A$,1)="E" OR LEFT$(A$,1)="I" OR LEFT$(A$,1)="O" OR LEFT$(A$,1)="U" THEN PRINT"N ";A$; ELSE PRINT" ";A$;
500 PRINT" FROM A";:IF LEFT$(B$,1)="A" OR LEFT$(B$,1)="E" OR LEFT$(B$,1)="I" OR LEFT$(B$,1)="O" OR LEFT$(B$,1)="U" THEN PRINT"N ";B$;"." ELSE PRINT" ";B$;"."
510 INPUTQ$:QUESTION$(QUESTION)=Q$:'SAVE NEW QUESTION
520 PRINT"FOR THE OUTCOME OF ";A$:PRINT"HOW WOULD YOU ANSWER";CHR$
```

Listing 2

QUESTION$*, contains a list of all the questions the program knows, and these are numbered in ascending order as they are learned. The second, *ANSWER$, contains a list of all the possible answers known to the program, and these too are numbered in ascending order as they are learned. The third table, *ARRAY(A,B)*, is the heart of the system, and contains the knowledge tree itself. This is used to link the questions and answers together. The left column of this array contains the data for a 'Yes' answer, whilst the right column contains that for a 'No'. If the number in the array is a positive number, then it is referring to another question, but if it is a negative number, then it refers to an answer.

First of all you will then be told to think of a car breakdown, and the computer will guess that it is a flat battery. If this is so, press <Y> and repeat the process. If the fault was not a flat battery, then press <N> and type in what the problem was (eg. 'empty petrol tank'). Then you will need to enter a question to tell a flat battery from an empty petrol tank, and then to enter the answer to that question for each of the two outcomes. Once the question has been accepted, the program returns to the options display. The next time the database is questioned the program will start with your question and produce its answer depending on whether you answer 'Yes' or 'No'. Each time it gets the answer wrong, the program will ask for the correct answer, and a question to tell it from the wrong answer. In this way it slowly builds up a quite extensive knowledge database.

Once a database has been created it can be saved or loaded by pressing the <S/L> keys from the options screen. (This is currently set up for use with a disk system, but can easily be changed for use with cassette tapes.) The first thing the program saves (Line 720) is the initial question used as a prompt. This will ensure that the correct starting phrase will be used whenever the database is reloaded. To modify the program for use on a different subject, simply change the initial question and answer proved in Line 20 the first time this new database is used. These modified values will be loaded back in whenever the database is reloaded.

The value of the expert system is not to be found in using it to help yourself, but in using it to help other people. If you know nothing about exotic birds, then you will not easily be able to set up a database about them. However, once you have set up a database on a subject with which you are well acquainted, this can very easily be accessed by a total novice to the field. The program will ask the questions you have entered, and will reach the verdict you would have reached, and if a new solution is found, the program will add it to its knowledge database.

The program is set up to distinguish between up to five-hundred different sclutions, and can be modified to handle more. If you run out of string space try *PCLEAR1* and increase the *CLEAR* command in Line 10. Once set up with a good database, the program should seem quite impressive to someone who does not know how it works.

```
    (63)
530 D$=INKEY$:IF D$=""THEN 530
540 IF D$="Y" THEN PRINT"YES":GOTO5
    70
550 IF D$="N" THEN PRINT"NO":GOTO57
    0
560 GOTO530
570 PRINT"FOR THE OUTCOME OF ";B$:P
    RINT"HOW WOULD YOU ANSWER":CHR$
    (63)
580 E$=INKEY$:IF E$=""THEN 580
590 IF E$="Y" THEN PRINT"YES":GOTO6
    20
600 IF E$="N" THEN PRINT"NO":GOTO62
    0
610 GOTO580
620 IF D$=E$THEN SOUND1,10:GOTO480
630 IF D$="Y" THEN ARRAY(QUESTION,0
    )=-AA:ARRAY(QUESTION,1)=-AB:' S
    ET QUESTION TO ANSWER ADDRESS
640 IF D$="N" THEN ARRAY(QUESTION,1
    )=-AA:ARRAY((QUESTION,0)=-AB
650 GOTO30
660 '**** SAVE DATABASE ****
670 CLS3:PRINT@10,"SAVE DATABASE";
680 PRINT@96,"INSERT DISC IN DRIVE.
    ...";:EXEC41194
690 IF FILE$="" THEN 700 ELSE KILLF
    ILE$+".DAT":CLOSE:GOTO710
700 PRINT@128,"";:INPUT"FILE NAME";
    FILE$
710 A=0
720 FWRITEFILE$;INITIALQUESTION$
730 A=A+1
740 IF ANSWER$(A)="" AND QUESTION$(
    A)="" THEN 800
750 FWRITEFILE$;ARRAY(A,0)
760 FWRITEFILE$;ARRAY(A,1)
770 FWRITEFILE$;QUESTION$(A)
780 FWRITEFILE$;ANSWER$(A)
790 GOTO730
800 PRINT@192,"FILE SAVED.":GOSUB95
    0:GOTO30
810 '**** LOAD DATABASE ****
820 INPUT "ENTER FILE NAME";FILE$
830 FREADFILE$;INITIALQUESTION$
840 A=1
850 FREADFILE$;ARRAY(A,0)
860 FREADFILE$;ARRAY(A,1)
870 FREADFILE$;QUESTION$(A)
880 FREADFILE$;ANSWER$(A)
890 IF EOF(FILE$)=0 THEN A=A+1:GOTO
    850
900 CLOSE
910 QUESTION=A
920 A=0
930 A=A+1:IF ANSWER$(A)<>""THEN 930
     ELSE ANSWER=A-1
940 GOTO30
950 FOR A=1 TO 2000:NEXT A:RETURN
960 '(C) 1985 BY PETER WHITTAKER.
```

Getting in control

*The new MXT controller opens up a new range of applications for your Dragon — **Roy Coates** checks it out*

THE LATEST addition to Compusense's armoury of hardware for the Dragon is the MXT controller cartridge from Beam Electronics. The cartridge fits snugly into the Dragons cartridge port and has integral legs to support the weight of the unit which is heavier than most cartridges owing to the weight of the relays that are encased within it.

The facilities offered by the cartridge include the ability to control up to four external devices (the controller is available in both 2 and 4 relay configurations) and to detect the condition of four input channels. A real-time clock is included in the package which enables the unit to be programmed to operate at set times which makes it suitable for many domestic applications such as heating control and lighting etc.

When the unit is plugged into the Dragon and the Dragon switched on, the program held on an EPROM within the cartridge automatically adds seven new commands to BASIC to enable the unit to be controlled easily from a BASIC program. The new commands allow you to set the real-time clock, access the clock (for timing purposes), switch each of the relays either ON or OFF and determine the status of each of the four input channels.

The commands are:

CLOCKSET — Which allows the real-time clock to be set to the current time.

CLOCKCHK — Which displays the current setting held by the real-time clock.

CLOCK — Which allows a BASIC variable to assume the values held by the clock.

SWITCHON — Which allows one of the relays to be energised.

SWITCHOFF Which will de-energise an active relay.

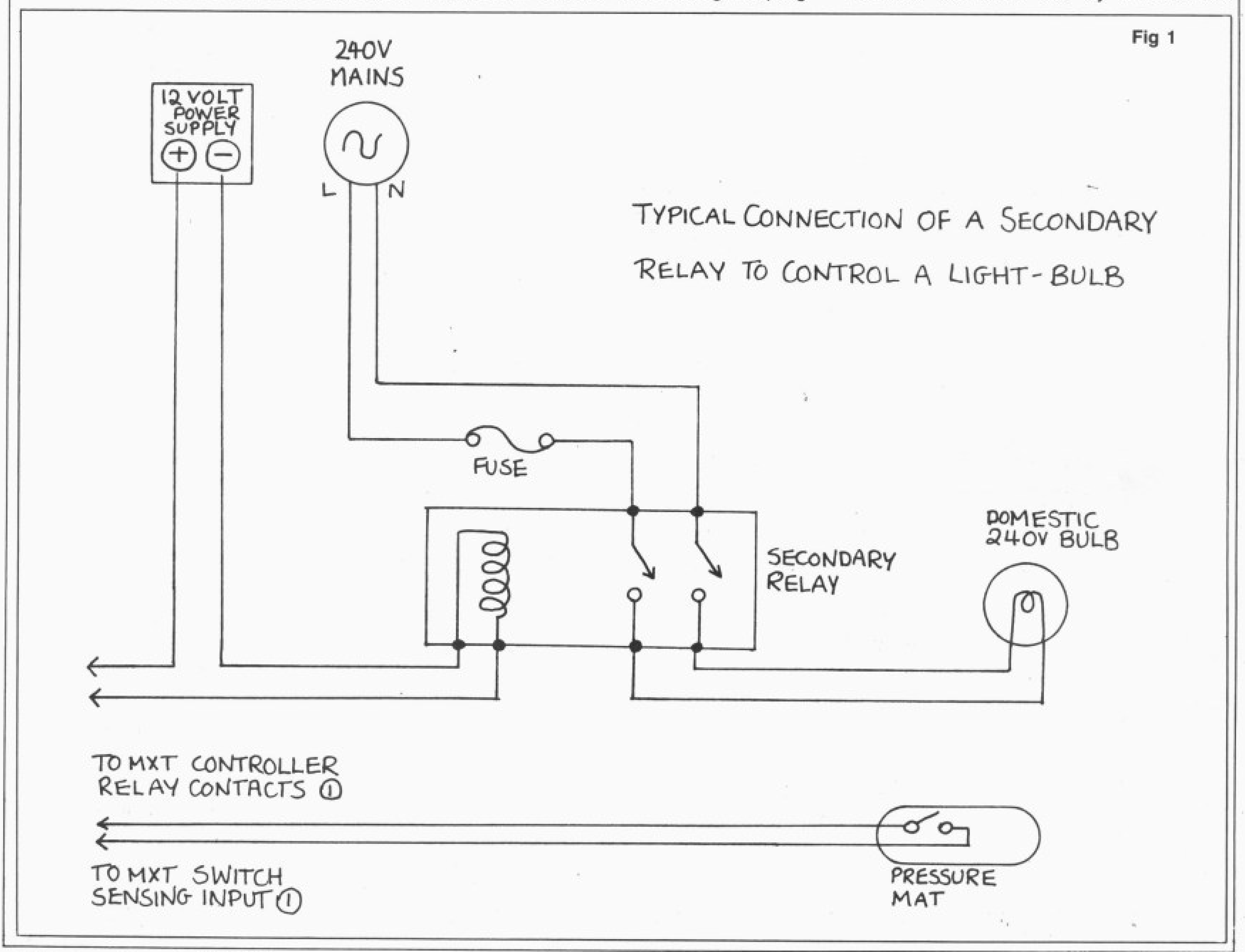
SWITCHIN — Which will return the status of a selected input port.

MON — Which activates the monitor program built into the cartridge.

The machine code monitor built into the MXT controller allows the assembler programmer to execute and de-bug his programs whilst the controller is present. The monitor is capable of examining and changing both the 6809's internal registers and user-specified memory locations, setting break-points to allow machine code program execution to be monitored at selected stores, execution of a machine code program itself, and finally a warm-start back to BASIC.

As with the added BASIC functions, the monitor commands are simple to use and easy to remember. The documentation supplied with the unit gives sufficient information on each of the new commands and some useful ideas and examples on how to implement them.

Care has obviously been taken in designing this unit for although the makers suggest that the clock should be accurate to within about two seconds a day, they give information on fine tuning the counters that control the clock itself. Three counters are employed and the most sensitive of these will alter the clock rate by a mere 0.1



seconds a day!!! (Apparently Dragon Data changed the main Crystal frequency in some of the earlier Dragons from 14.218Mhz to 14.31818Mhz, details for adjusting the clock to compensate for this are also given.)

Connections to the MXT unit are made by means of some very neat screwless terminals, these simply require a screwdriver to depress the spring-loaded assembly whilst the wire is inserted and this provides a secure connection to the cable.

Relays

The relays used in this controller are rated up to a **maximum** of 3 Amps at 24 Volts DC and a **maximum** of 2 Amps at 240 Volts AC and it is worth mentioning that the manufacturers strongly recommend that mains voltages should not be switched by the relays in the unit but by secondary external relays driven by passing a lower voltage through the relays of the MXT unit.

The MXT controller unit may be used for all sorts of applications from a simple burglar alarm system to the control of a model railway. A useful application would be the automatic switching on of a house light at a set time in the evening. (See Fig 1). The following program will switch a light on at 6pm (1800 hrs) and switch it off at 11pm (2300 hrs). The switching on of the lamp may be over-ridden by a pressure mat connected to input switch 1.

A buglar alarm circuit may be made up in such a way that all trigger switches are connected in series to one of the input sensors and the alarm bell triggered by a secondary relay driven from one of the MXT relays.

The uses to which this unit may be put are so varied that it would be impossible to list them all. It is well made and the price compares fairly with other such products on the micro-market. The software is simple to use and the unit appears to be quite reliable. The only reservation that I would have personally is that the power to drive a multiple relay operation may, in the long term, be too much for the Dragon's already weak power switch.

Product *MXT controller*
Micro *Dragon 32*
Price *2-relay £29.95, 4-relay £36.95.*
Supplier *Compusense Ltd, PO Box 169, 286D Green Lanes, London N13 5XA. Tel: 01-882 0681.*

```
10 REM PROGRAM TO SWITCH LIGHT ON AT 6PM AND OFF AT 11PM.
20 REM
30 REM
40 T=CLOCK(H)                  :'CHECK FOR 6PM.
50 IF T = 18 THEN 40           :'IF NOT 6PM THEN TRY AGAIN.
55 IF SWITCHIN 1 = 0 THEN 40   :'PRESSURE MAT OPERATED ??
60 SWITCHON 1                  :'ACTIVATE RELAY ONE.
70 REM NOW CHECK FOR 11PM TO TURN THE LIGHT OFF.
80 T=CLOCK(H)
90 IF T <> 23 THEN 90          :'NOT 11PM SO TRY AGAIN.
100 SWITCHOFF 1                :'11PM SO SWITCH RELAY ONE OFF.
110 END
```

Countdown

Only ninety seconds to save the Earth — are you up to the challenge of this machine code game by ***Steve Gathercole?***

THE INTERGALACTIC Federation has informed us that Earth is to be blown up to make way for a new Milky Way. Three bombs have been placed within the depths of the Earth, you have approximately one and a half minutes to destruction. Thank you for your attention.

To destroy the bombs you must first jump on your jet sled as it passes underneath you — use the right joystick fire button for this. Now you have complete control over the jet sled, so using the right joystick manoeuvre down to the righthand side of the screen and using the fire button blast away at the walls with your short range laser. Now get in at the bombs and destroy them. Unfortunately you must not bump into anything or you will lose one of your lives; this also applies if you get too close to the bombs.

Your score will depend on the bonus left at the end, which is calculated on the time left. This is then displayed in the Hall of Fame. A useful tip . . . press the fire button and move at the same time.

```
10 CLS
20 REM HEXLOADER - ENTER THE
30 REM STRING OF HEX DIGITS FIRST
40 REM AND THEN THE CHECKSUM
50 CLEAR200,19999
60 PRINT"ENTER START ADDRESS";:INP
UT START
70 PRINT"ENTER FINISH ADDRESS";:IN
PUT FINISH
80 FOR N=START TO FINISH STEP 11
90 PRINTN;":";
100 TT=0:INPUT A$:Z=0
110 FOR G=1 TO LEN(A$) STEP 2
120 P=VAL("&H"+MID$(A$,G,2))
130 TT=TT+P:POKE (N+Z),P
140 Z=Z+1:NEXT
150 PRINT"=";
160 INPUT T$
170 IF T$<>HEX$(TT) THEN SOUND 20,
30:PRINT"ERROR - ENTER LINE AGAIN"
:GOTO 100
180 NEXT
```

Listing 3

Instructions

To load the game proceed as follows. First type in LISTING 1; the Basic "runner" for the game. Check all looks OK and save to tape as normal, but do not run this yet as it calls up machine code not yet in memory.

Next type in LISTING 2, the screen display (the machine code adds the rest). If all looks OK, save to tape directly after LISTING 1 using *CSAVEM "SCRN", 1536,7679,6144.*

Now switch off and then on (to clear memory) and type in LISTING 3. This is a hexloader for the machine code and is the same as used for Clayshoot and Torpedo, so if you already have this on tape you can use it again. When you run LISTING 3 you will be asked for the start address. Type in 20000 then press Enter — you will now be asked for the finish address. Type in 22908 then press Enter. Now you must type in the rows of hex digits up to but not including the "=" sign, (LISTING 4), then press Enter. You must now type in the checksum (the number after the "=" sign). Press Enter, and if all is well the next address will be displayed. Carry on as before, until the end.

When finished, save this to tape using *CSAVEM "COUNTD",20000,22908, 20000,* saving this directly behind SCRN. Rewind the tape and you are ready to go — type CLOAD then RUN.

If you want to type in LISTING 4 in small amounts, do this by typing in the finish address you want to finish at and save to tape using *CSAVEM "COUNTD",20000, n,20000,* where "*n*" is your finish address. Remember to CLOADM this before starting up next time and use "n" as your start address. Or if you find the prospect of all this typing too much then send me £1.50 at the following address and I will gladly send you a copy. Steve Gathercole, 16 Hankinsons Estate, Walpole St Andrew, Wisbech, Cambridgeshire PE14 7NA.

```
90 PCLEAR8
100 CLEAR200,19999
110 CLS3:PRINT@267,"COUNTDOWN";
120 PRINT@326,"BY STEVE GATHERCOLE
";
130 FOR N=1 TO 3
140 PLAY"O3V31T15L8CCDDEE"
150 NEXT N
160 FOR N=1 TO 200:NEXT N
170 CLS4:PRINT@267,"LOADING M/C";
180 CLOADM:CLS2:PRINT@268,"HALF DO
NE";:CLOADM
190 PCOPY 1 TO 5:PCOPY2 TO 6:PCOPY
 3 TO 7:PCOPY 4 TO 8
200 T$="STEVE":C$="NOBODY":D$="NOB
ODY":E$="NOBODY":F$="NOBODY":A1=0:
A2=353:A3=0:A4=0:A5=0:A6=0
210 POKE&H550A,0:POKE&H550B,0:POKE
 &H550C,0:TIMER=0
220 PCOPY 5 TO 1:PCOPY 6 TO 2:PCOP
Y 7 TO 3:PCOPY 8 TO 4
230 PMODE 3,1:SCREEN 1,0
240 EXEC 20000
250 SC=(PEEK(&H550B)*256+PEEK(&H55
0A))*10
260 TI=(PEEK(&H112)):T=TI*7
270 CLS 7:PRINT@201,"YOU SCORED";S
C;
280 PRINT@293,"YOU USED";TI*5;"SEC
ONDS ";
290 PRINT@357,"YOU HAVE A BONUS OF
";T;
300 PRINT@418,"THIS GIVES YOU A SC
ORE OF";SC+T;
310 FOR N=1 TO 4000:NEXT N
320 CLS RND(8)
330 A1=SC+T
340 IF A1>A6 THEN PRINT@96,"";:INP
UT "YOUR NAME";Z$ ELSE 370
350 IF A1>A2 THEN A6=A5:A5=A4:A4=A
3:A3=A2:A2=A1:F$=E$:E$=D$:D$=C$:C$
=T$:T$=Z$:GOTO 370 ELSE IF A1>A3 T
HEN A6=A5:A5=A4:A4=A3:A3=A1:F$=E$:
E$=D$:D$=C$:C$=Z$:GOTO 370 ELSE IF
 A1>A4 THEN A6=A5:A5=A4:A4=A1:F$=E
$:E$=D$:D$=Z$:GOTO 370
360 IF A1>A5 THEN A6=A5:A5=A1:F$=E
$:E$=Z$:GOTO 370 ELSE A6=A1:F$=Z$
370 PRINT@170,A2"BY "T$;:PRINT@234
,A3;"BY "C$;:PRINT@298,A4;"BY ";D$
;:PRINT@362,A5;"BY ";E$;:PRINT@426
,A6;"BY ";F$;
380 L$="T5O2L12AGBEDFADF£":L$=L$+
L$
390 PLAY L$+L$
400 PRINT@486,"ANOTHER GAME (Y/N)
?";
410 Q$=INKEY$:IF Q$="" THEN 410
420 IF Q$="Y" THEN 210
430 IF Q$="N" THEN END
440 GOTO 410
```

Listing 1

```
10 PMODE 3,1:SCREEN 1,0
20 DIM S(8,8)
30 A=1536
40 FOR N=1 TO 8
50 READ S:POKE A,S
60 A=A+32
70 NEXT N
80 IF A>1537 THEN 120
90 A=1537
100 GOTO 40
110 DATA 255,255,00,255,00,00,255,
00,255,00,00,00,00,00,00,255
120 GET(0,0)-(8,8),S,G
130 PCLS
140 COLOR2
150 LINE(0,14)-(256,14),PSET
160 FOR Y=57 TO 57 STEP 8
170 FOR X=2 TO 198 STEP 8
180 GOSUB 490
190 NEXT X
200 NEXT Y
210 FOR Y=62 TO 78 STEP 8
220 FOR X=2 TO 130 STEP 8
230 GOSUB 490
240 NEXT X
250 NEXT Y
260 FOR Y=86 TO 103 STEP 8
270 FOR X=2 TO 198 STEP 8
280 GOSUB 490
290 NEXT X:NEXT Y
300 FOR Y=110 TO 127 STEP 8
310 FOR X=2 TO 66 STEP 8
320 GOSUB 490
330 NEXT X:NEXTY
340 FOR Y=134 TO 143 STEP 8
350 FOR X=2 TO 198 STEP 8
360 GOSUB 490
370 NEXT X:NEXT Y
380 FOR Y=178 TO 194 STEP8
390 FOR X=2 TO 198 STEP 8
400 GOSUB 490
410 NEXT X:NEXT Y
420 X=69:FOR Y=150 TO 174 STEP 8
430 GOSUB 490:NEXT Y
440 COLOR3
450 LINE(0,15)-(256,194),PSET,B
460 LINE(2,16)-(253,193),PSET,B
470 COLOR4:LINE(198,57)-(206,194),
PSET,BF
480 GOTO 480
490 PUT(X,Y)-(X+8,Y+8),S,PSET
500 RETURN
510 GOTO 510
```

Listing 2

```
20000 1604D5000A2C0CAA000004 = 1DF
20011 0000000300054005401010 = AD
20022 1010101010101010101005 = A5
20033 4005400100050001000100 = 8D
20044 0100010001000100010005 = A
20055 4001000440101000100040 = F5
20066 0100040010001000155005 = 8F
20077 4010101010001001400140 = 112
20088 0010101010100540100010 = B5
20099 0010001100110011001550 = A8
20110 0100010001001550100010 = 88
20121 0010001540155000100010 = EA
20132 0010154005401550101010 = 13F
20143 0015401550101010101550 = 15F
20154 0540155015500010004001 = 160
20165 4001000400040010001000 = 69
20176 0540054010101010054005 = 114
20187 4010101010054005400540 = 14F
20198 0540101010100550055000 = 12F
20209 1000100540054005400550 = 144
20220 1000100005400550001000 = CA
20231 1015400540054005501010 = 164
20242 1000100010001000101005 = 65
20253 5005400540054010101010 = 15F
20264 1010101010101010054005 = CA
20275 4005400540101010101540 = 15F
20286 1540110010401050101005 = 13B
20297 5005501000100015401540 = 16F
20308 1000100005500550800080 = 1CA
20319 0080008000800080208020 = 2C0
20330 8020AAA0AAA02A800A000A = 3F2
20341 000A000A000A000A000A00 = 32
20352 0A002A8080088008A02820 = 2AC
20363 2028A008800A800A800200 = 286
20374 0200AAA8AAA880088080AA = 4D8
20385 80AA808080808008AAA8AAA8 = 5D6
20396 2AA02AA8A008A0002A800A = 398
20407 A000288028AAA02AA00000 = 384
20418 0000000000000000140040 = 54
20429 0010000400500050004400 = F8
20440 4400500040004000000000 = 114
20451 0000000000000000004000 = 40
20462 4000400040005400540000 = 168
20473 0000000000000010004400 = 54
20484 5400440044000000000000 = DC
20495 0000000000000000005400 = 54
20506 1000100010001000000000 = 40
20517 1000007400007400001000 = 108
20528 00400001D00007F5000740 = 254
20539 80051020AA0408AA100A2A = 259
20550 6AAA0A6AAA0AAAAA02AA80 = 4BC
20561 000400001D00001D000004 = 42
20572 0000010000074000 5FD002 = 179
```

Listing 4 — cont on p16

```
20583 01D00804502010AAA004AA = 355
20594 AAA9A8AAA9A0AAAAA002AA = 68E
20605 8000000000000000000000 = 80
20616 0000000000000000000000 = 0
20627 00008000020AA0008AA00 = 1FC
20638 0A2AAAAA0AAAAA0AAAAA02 = 446
20649 AA8004000004000150000 = 147
20660 1500002A00002A00002A00 = 93
20671 002A00000800002A0000AA = 106
20682 8000A2800080800000000 = 2A2
20693 0000000800000800002A00 = 3A
20704 00AA8000AA8000AA8000AA = 428
20715 8000AA8000080000 2A0000 = 1DC
20726 AA8000A28000808000000 = 34C
20737 0000000044400015000004 = 9D
20748 0000444000110000040000 = 99
20759 5140005540001500001500 = 150
20770 0004000004000004000000 = C
20781 0000000000001000007400 = 84
20792 0074000074000010000040 = 138
20803 0001D00007F50007400005 = 219
20814 0000050000104400401400 = AD
20825 4004001000000000000400 = 58
20836 001D00001D000004000019 = 57
20847 0000150000195000190000 = 97
20858 1500000400000400000400 = 21
20869 0004000005000000000000 = 9
20880 0000000000000000000000 = 0
20891 0000000000000000000000 = 0
20902 0000000000000000000000 = 0
20913 0000000000000000000000 = 0
20924 0000003476A7E2EEA1EF81 = 532
20935 A6A0A7803A6AE426F33261 = 5A1
20946 35F63476A7E2EEA1EF813A = 697
20957 6AE426F7326135F61700E2 = 522
20968 86023402C60F86E8B7FF22 = 4D9
20979 8D2386F0B7FF228D1C5A26 = 527
20990 EF1700C835024A26E34F10 = 3B7
21001 8E4E2BA7A0A7A0A7A48603 = 569
21012 B74E2E398E05DC301F8C00 = 3B6
21023 0026F939343613C60F8602 = 332
21034 1CFEBE4E268D3A30018D36 = 407
21045 30018D3230018D2E4A26EA = 336
21056 BE4E26308820BF4E265A26 = 3BD
21067 DC3089FE20BF4E26F64E2A = 554
21078 5AF74E2A260DC604F74E2A = 435
21089 BE4E263001BF4E2635B634 = 3B5
21100 36E68456E78435B6343630 = 4E6
21111 8820108E5132860FC61D17 = 358
21122 FF3B17FF9C108E518F860F = 4FF
21133 C61D17FF2D8C0AEE25DF35 = 4E3
21144 B63436B6FF238A08B7FF23 = 563
21155 8E000186FDB7FF208D167F = 50A
21166 FF208D1130018C00FE25ED = 48A
21177 B6FF2384F7B7FF2335B61F = 636
21188 12313F22FC393436B6FF23 = 41B
21199 8A08B7FF237F01478EB98C = 505
21210 A6808D0EA6808D0A7A0147 = 440
21221 26F3B6FF2335B6B40147B7 = 58F
21232 FF2086B84A26FD394FB74E = 557
21243 2F8E0640108E4EF8860AC6 = 43D
21254 1E17FECA31A8143002108C = 3B8
21265 4F5C26EE108E4F5C8E0653 = 3EF
21276 860AC61E17FEB131A81430 = 457
21287 02108C4FC026EE108E4E30 = 3DD
21298 8E064B860AC61E17FE9830 = 430
21309 028C065126F2B64E2EC614 = 409
21320 3DC34E301F028E065E860A = 321
21331 C61E17FE7C8E0A8AC60386 = 4E6
21342 FFA7843088205A26F68E0E = 514
21353 72108E50D8860FC61D17FE = 4C5
21364 4A8E144A860FC61D17FE40 = 403
21375 8E19C1860FC61D17FE368E = 4B9
21386 0B4CBF4E26C600F74E23B6 = 46E
21397 4E2381011027 01608E0AC1 = 2E4
21408 108E507E860FC61D17FE14 = 40D
21419 8E08AA108E516217FE0A8E = 43E
21430 0AE1BF4E2617FE65B6FF00 = 54D
21441 817E273481FE273010BE4E = 44C
21452 26108C0AF326E8108E518F = 44B
21463 8E0AF3860FC61D17FDDE10 = 505
21474 8E0AE110BF4E268E0AC110 = 425
21485 8E507E860FC61D17FDC820 = 4D0
21496 C2108E518F8E08AA860FC6 = 4DB
21507 1D17FDB88E080CBF4E2410 = 3CC
21518 8E5132860FC61D17FDA710 = 454
21529 BE4E26108C0AF32624108E = 3B3
21540 518F8E0AF3860FC61D17FD = 4F7
21551 8F108E0AE110BF4E26108E = 3F9
21562 507E8E0AC1860FC61D17FD = 4B3
21573 7917FDDABE4E24108E518F = 515
21584 860FC61D17FD68308820BF = 48B
21595 4E24108E5132860FC61D17 = 322
21606 FD578C0A2C25AB108E0C2C = 3BC
21617 A6A48580270316008 68E09 = 3AC
21628 B5108E4FC0860AC61E17FD = 4EA
21639 4C300231A814108C502426 = 2A1
21650 EE8E09EC108E518F860FC6 = 54A
21661 1D17FD1E8E0AE1BF4E2686 = 481
21672 04B74E2A8E0AE1860FC61D = 424
21683 17FD0930018C0AFB26F217 = 40E
21694 FDD917FDD68E065EB64E2E = 5E4
21705 4A81002605C601F74E23B7 = 3DC
21716 4E2EC6143DC34E301F0286 = 37B
21727 0AC61E17FCEF8E09B5108E = 4DA
21738 518F860AC61E17FCE13002 = 47A
21749 8C09BF26F216FE977E51E5 = 5CB
21760 1601330000010001010016 = 63
21771 00003436B6550A4CB7550A = 2E1
21782 8E064D108E4E2BA6A44C81 = 40F
21793 0A2713A7A4C6143DC34E30 = 3E7
21804 1F02860AC61EBD51D435B6 = 462
```

Listing 4 — cont on p21

DRAGON OWNERS

& TANDY COLOUR

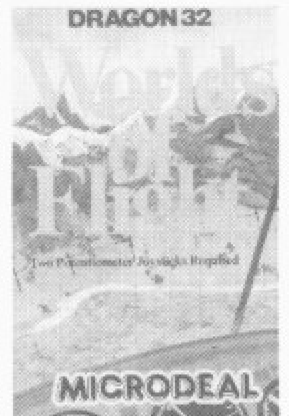
microdeal

BLOCKBUSTER SALE!

ENDS MARCH 31st!

Tick ✓ to order

SIMULATIONS . . . .



WORLDS OF FLIGHT

Dragon 32/64 ☑

Tandy Colour 32K ☐

PRICE NOW £4



AIR TRAFFIC CONTROL

Dragon 32/64 ☐

PRICE NOW £2

SPACE SHUTTLE



Dragon 32/64 ☐

Tandy Ext 32K ☐

PRICE NOW £2

BLOCKBUSTERS PRICE ALL 3 PRODUCTS **£6** ☐

ADVENTURES . . . . .



KEYS OF THE WIZARD

Dragon 32/64 ☐

PRICE NOW £3



CAVERNS OF DOOM

Dragon 32/64 ☐

Tandy 32K ☐

PRICE NOW £3



SYZYGY

Dragon 32/64 ☐

Tandy 32K ☐

PRICE NOW £3

BLOCKBUSTERS PRICE ALL 3 PRODUCTS **£5** ☐

MORE BLOCKBUSTERS >

1

ARCADE CLASSICS . . . . .

ENDS MARCH 31st!





BUZZARD BAIT
Just like "Joust"
Dragon 32/64 ☐

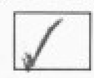
PRICE NOW £4



SPEED RACER
Just like "Pole Position"
Dragon 32/64 ☐ Tandy 32K ☐

PRICE NOW £4



ELECTRON
Just like "Tron"
Dragon 32/64 

PRICE NOW £3

***BLOCKBUSTERS PRICE** ALL 3 PRODUCTS* **£8** ☐

LATEST RELEASES . . . . . .



SHOCK TROOPER
Dragon 32/64 ☐ Tandy 32K ☐

PRICE NOW £4



THE DARK PIT
Dragon 32/64 ☐ Tandy 32K ☐

PRICE NOW £4



SPACE WREK
Dragon 32/64 ☐ Tandy 32K ☐

PRICE NOW £4

***BLOCKBUSTERS PRICE** ALL 3 PRODUCTS* **£9** ☐

MEGA SELLERS . . . . .



MR DIG
Dragon 32/64 ☐

PRICE NOW £3



CASHMAN
Dragon 32/64 ☐

PRICE NOW £3



TIME BANDIT



Dragon 32/64 ☑
Tandy 32K ☐

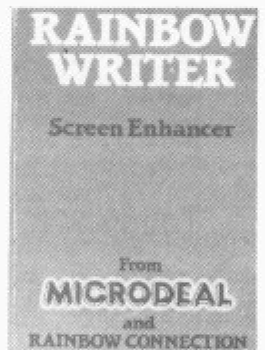
PRICE NOW £3

***BLOCKBUSTERS PRICE** ALL 3 PRODUCTS* **£7** ☐

UTILITIES . . . . . .

COMPOSER
Dragon 32/64 ☐

PRICE NOW £5



RAINBOW WRITER
Dragon 32/64 ☐

PRICE NOW £5

SALAMANDER GRAPHICS SYSTEM

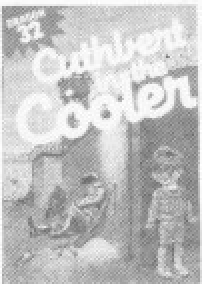
PRICE NOW £3 ☐

***BLOCKBUSTERS PRICE** ALL 3 PRODUCTS* **£10** ☐

MORE BLOCKBUSTERS >

CUTHBERT SPECIALS . . . . .

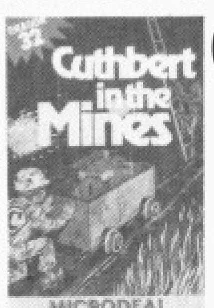
ENDS MARCH 31st!



CUTHBERT IN THE COOLER

Dragon 32/64 ☐ Tandy 32K ☐

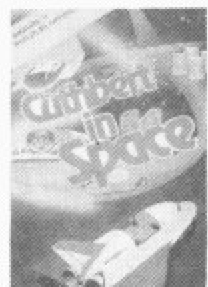
PRICE NOW £3



CUTHBERT IN THE MINES

Dragon 32/64 ☐

PRICE NOW £3

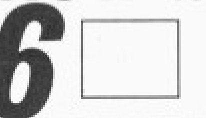


CUTHBERT IN SPACE

Dragon 32/64 ☐

PRICE NOW £2

BLOCKBUSTERS PRICE ALL 3 PRODUCTS **£6**

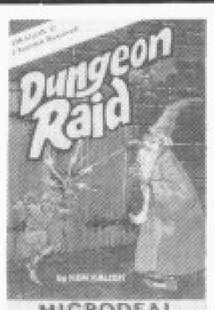




DANGER RANGER

Dragon 32/64 ☐

PRICE NOW £3



DUNGEON RAID

Dragon 32/64 ☐

PRICE NOW £3



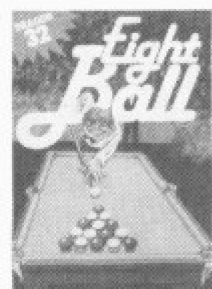
PHANTOM SLAYER

Dragon 32/64 ☐

PRICE NOW £3

BLOCKBUSTERS PRICE ALL 3 PRODUCTS **£3** ☐

THINKING MAN'S GAMES . . . . .



EIGHT BALL

Dragon 32/64 ☐

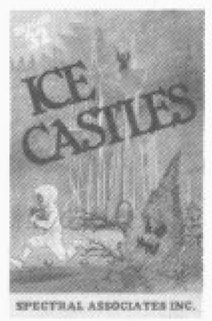
PRICE NOW £3



SPACE FIGHTER

Dragon 32/64 ☐

PRICE NOW £3



ICE CASTLES

Dragon 32/64 ☐ Tandy 32K ☐

PRICE NOW £3

BLOCKBUSTERS PRICE ALL 3 PRODUCTS **£6** ☐

SALAMANDER'S SPECIALS . . . . .



LASER ZONE

Dragon 32/64 ☐

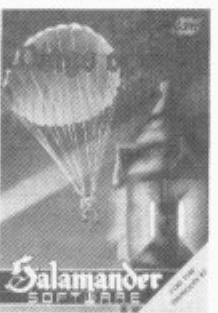
PRICE NOW £2



CRICKLE WOOD INCIDENT

Dragon 32/64 ☐

PRICE NOW £2



WINGS OF WAR

Dragon 32/64 ☐

PRICE NOW £2

BLOCKBUSTERS PRICE ALL 3 PRODUCTS **£4**



3

```
21815 4FA7A43420C6143DC34E30 = 446
21826 1F02860AC61EBD51D43520 = 3CC
21837 3121301E8C064926C735B6 = 353
21848 343613BE4E26108E518F86 = 3B3
21859 0FC61DBD51BFB6015A8120 = 471
21870 2506108E50242004108E50 = 24F
21881 51860F308820BD51BF5FF7 = 4E1
21892 5504F75503BF4E2635B634 = 3FA
21903 3613BE4E26108E518F860F = 38E
21914 C61DBD51BFB6015A811E22 = 482
21925 06108E50512004108E5024 = 27B
21936 860F3088E0BD51BF5FF755 = 5A5
21947 04F75503BF4E2635B64FB7 = 477
21958 4E23B755098603B74E2E8E = 3D0
21969 4E2B4FA780A780A784B755 = 54D
21980 0C16FC053436BD801213C6 = 3B5
21991 0F86021CFEBE4E2630028D = 3A2
22002 3A301F8D36301F8D32301F = 2A9
22013 8D2E4A26E8BE4E26308820 = 41D
22024 BF4E265A26DA3089FE20BF = 523
22035 4E26F64E2A5AF74E2A260A = 3DB
22046 C604F74E2ABE4E26301FBF = 479
22057 4E2635B63436E68459E784 = 4F7
22068 35B6BDBAC317FED18E0A2C = 5CF
22079 860FC61D108E518FBD51BF = 4C3
22090 F64E2AC1042706BD52235A = 3EC
22101 26FABE4E26308820BF4E26 = 45D
22112 860FC61D108E5024BD51BF = 457
22123 4FB75509B64E2EC6143DC3 = 470
22134 4E301F028E065E860AC61E = 305
22145 BD51D486FFB7FF0017014A = 57F
22156 B6550C8103102702CB8601 = 326
22167 B4FF002603170208B64E23 = 324
22178 81011027FF1CB655098101 = 36A
22189 260316FCEBB60112810F10 = 38F
22200 27FF09BD8012B6015B8132 = 443
22211 1022008B810C102500A9B6 = 2DE
22222 015A81012542813E220316 = 23E
22233 FFAEBD8012F75503F65504 = 59A
22244 C1012720F64E2AC1042706 = 369
22255 BD55E05A26FA108E5024BE = 53C
22266 4E26860FC61DBD51BFC601 = 480
22277 F75504BD52238601B75505 = 41A
22288 B7550816FF73BD8012F655 = 536
22299 03C10127245FF75504F64E = 403
22310 2AC1042706BD52235A26FA = 3C8
22321 BE4E26108E5051860FC61D = 3E9
22332 BD51BFC601F75503BD55E0 = 5D5
22343 C601F75506F7550716FF37 = 4B8
22354 108C50242642B655058101 = 30A
22365 2611B64E2A81042706BD52 = 326
22376 234A26FA4FB7550517FDE5 = 4E6
22387 16FF13108C5024263CB655 = 3A5
22398 0881012611B64E2A810427 = 29B
22409 06BD52234A26FA4FB75508 = 405
22420 17FDF716FEEFB655068101 = 5A1
22431 2611B64E2A81042706BD55 = 329
22442 E04A26FA4FB7550617FDA3 = 562
22453 16FED1B6550781012611B6 = 466
22464 4E2A81042706BD55E04A26 = 38C
22475 FA4FB7550717FDBB16FEB3 = 5F2
22486 3436BE4E2630890200A680 = 37D
22497 81002633A6808100262DA6 = 37A
22508 8481002627BE4E263088E0 = 41C
22519 A6808100261BA680810026 = 3B5
22530 15A6848100260FBE4E2630 = 357
22541 8900DFA6848580260235B6 = 4AA
22552 B64E2E810027294AB74E2E = 380
22563 C6143DC34E301F028E065E = 36B
22574 860AC61EBD51D417002A17 = 3AE
22585 0027170024170021B64E2E = 1CC
22596 81002605C601F74E23BE4E = 3E7
22607 26108E518F860FC61DBD51 = 42A
22618 BF8601B7550935B63436F6 = 4A6
22629 4E2AC1042717B6015A8103 = 310
22640 2206BD55E05A26FA813C25 = 476
22651 06BD52235A26FABE4E2610 = 3F4
22662 8E0003C60FA68443A78430 = 42E
22673 88205A26F53089FE21313F = 465
22684 108C000026E717F9F435B6 = 498
22695 3436BE4E26B6015A812022 = 370
22706 2C3410308900FFC604A684 = 41C
22717 810027028D7586FFA78430 = 48C
22728 1F5A26EF17001235103089 = 2B5
22739 00FFC6044FA784301F5A26 = 412
22750 F935B63436B6FF238A08B7 = 56F
22761 FF238E000186FDB7FF208D = 597
22772 167FFF208D1130018C003F = 34E
22783 25EDB6FF2384F7B7FF2335 = 673
22794 B61F12313F26FC39108E51 = 3A1
22805 05860FC61DBD51BFBD52CA = 523
22816 108E518FBD51BFC60A17FB = 52D
22827 E15A26FAB6550C4CB7550C = 4D6
22838 20263436A6848180261E8C = 3AB
22849 105422058E0E7220C88C16 = 323
22860 2C22058E144A20BE8C19C1 = 383
22871 25058E19C120B435B64FB7 = 457
22882 550C8E4E2BA780A780A784 = 4E1
22893 8603B74E2E39398603B74E = 3BC
22904 2E393939390E0E0EEFEFEF = 409
```

Listing 4

Heart of the matter

*This month Messrs **Orbaum** and **Campbell** reveal the joys of chip architecture and flowcharting in part two of our series on machine code.*

LAST MONTH we showed you a small glimpse of the world of assembler programming. Before we start programming however, there are a few more things that form the basis of the programmer's world. Two in particular are processor architecture and flowcharting — in that order.

Processor architecture has nothing at all to do with Sir Christopher Wren, but then again it has very little to do with programming. It is, however, handy to keep in mind the way the processor deals with the instructions that it is obeying, as this way more efficient code can be written.

Registers

The diagram in Figure One shows the internal structure of the 6809E, giving the relationships of all the registers and busses. The easiest way to think of a register is as another memory location. The same difference is that of speed — to access the contents of a register, the processor does not need to go outside the immediate environment. The registers all have different uses, as listed below:

PC — Program Counter. Used to point to the next instruction to be executed, and therefore 16 bits wide. Very rarely is this used by programmers. Although it is possible to change the contents, the results are tricky to control, and the desired result can usually be achieved in simpler and easier ways.

S — System Stack Pointer. A stack is a list of bytes, used for many purposes. The analogy of a stack of plates has been quoted in many other places, and is not strictly true, as the stack pointer can be changed to access bytes out of sequence. The pointer contains the address of the next free byte on the stack, and is updated whenever something is pushed to or popped from the stack. The system stack is used, as its name suggests, to store return addresses for subroutine calls. As the stack can be placed anywhere in memory, this register is sixteen bits wide.

U — User Stack Pointer. The 6809 is unusual amongst processors in that it has two stacks. The user stack is not used by the processor, and so it is safest to use the user stack for all your data, then if anything is left on the stack by a subroutine — normally fatal when it comes to time to retrieve the return address — the program runs all right. On the other hand, if this process is followed, the first indication that something is wrong comes when the stack has grown far enough to overwrite something important. On the whole we generally ignore the user stack, but it can be useful on occasion.

X and Y — Index Registers. Like all processors, the 6809 has several index registers, for use in accessing memory. Unlike most, both indices on the 6809 can access the entire range of addressable memory — all 64k, if fitted. This is because they are 16 bit registers. They are used as an offset for accessing, for example, tables of data, but they have many other uses, as we shall cover later.

DP — The Direct Page Register. Memory is divided, nominally, into pages of 256 bytes. For speed, it is possible to specify which page operations are going to occur in, and then to have the address as an eight bit offset within this page. This is only really useful if there are going to be a large number of memory operations within a 256 byte area — for example sorting a small data table.

D — The Accumulator. The 6809 is also unusual in that it has a 16 bit accumulator. This is the register that is used for most of the arithmetic functions. It can also be used as two eight bit registers, A and B, for functions not exceeding 256.

CC — The Condition Code Register. This is best thought of as eight separate bits, as they are rarely accessed as a byte. Each bit serves a different function, and is used as a flag to show whether or not an event has occured. We will deal with these separately as we come to them.

Many of these explanations will only become clear when addressing modes are covered at a later date.

The ALU is the Arithmetic Logic Unit, and executes arithmetic functions such as addi-

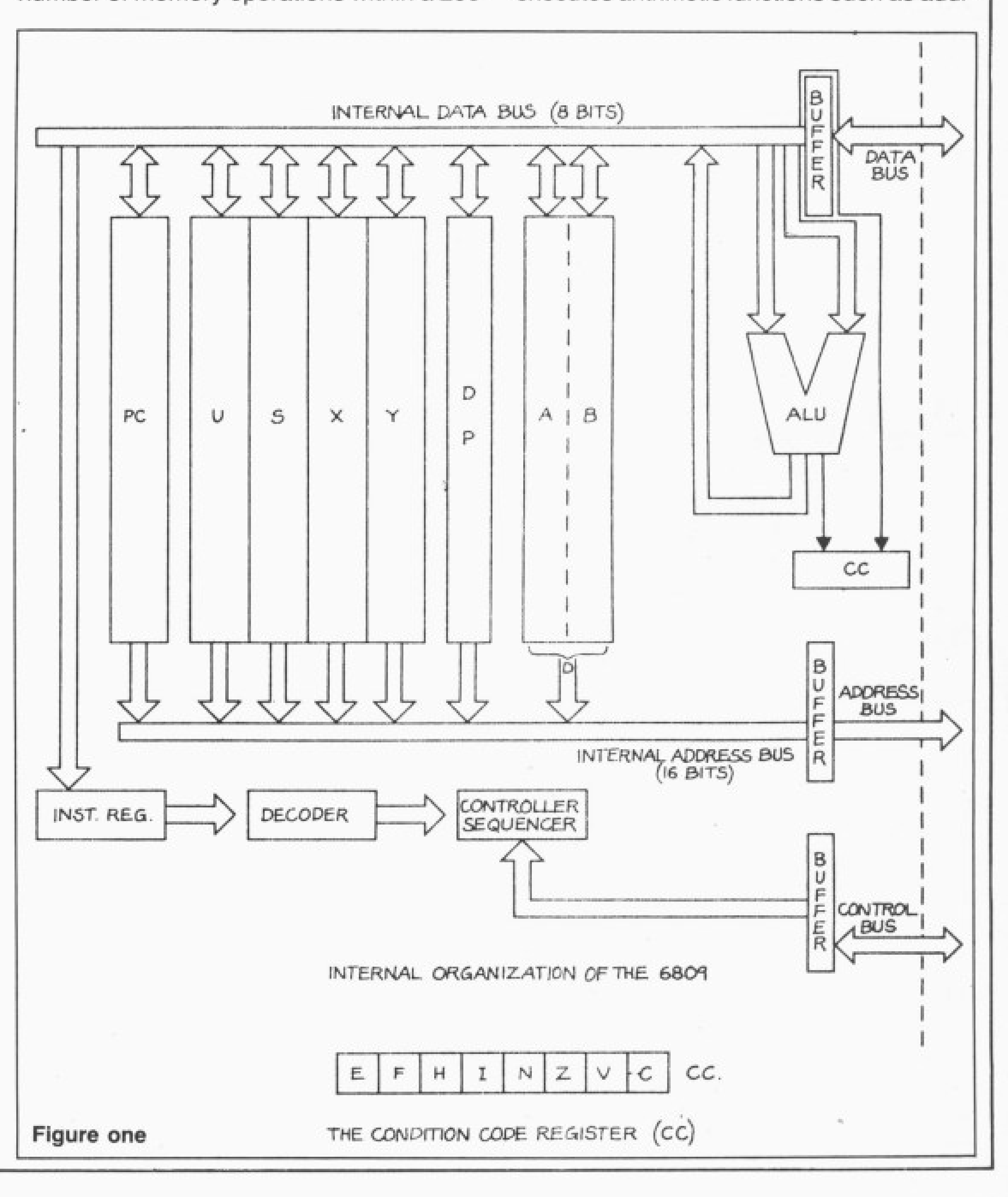


Figure one

tion, subtraction, and, surprisingly, multiplication, a function that normally needs implanting in software.

The data and address busses are both used for communication between various parts of the chip, and, through a buffer, with devices such as memory chips.

The controller sequencer is the bit that controls all the registers and the ALU, with help from the instruction register and the decoder.

Now on to a subject that has made grown men cringe, and is widely ignored by programmers, analysts, consultants, and bus drivers, despite its relative importance. Yes, its flowcharting! Many people think this is only of use for very large programs, but with a language like assembler, where there are a large number of lines of code, it is often very easy to lose track of the overall direction of the program, when concentrating on a few lines at a time. Then a flowchart comes in handy. There are a multitude of symbols, courtesy of the boys at the ISO, but of these, only three are of any use — Process, Decision, and Start/Stop.

The basic principles of flowcharting are very simple. The most important thing is to be able to look at whatever is being coded as a whole, then break it down into manageable chunks in logical sequence. What a manageable size is depends on many things, including the size of the whole task, the programmer, the size of the finished flowchart.

The only guide it is possible to give is to say that the flowchart itself should not get out of hand.

The symbols are as follows:

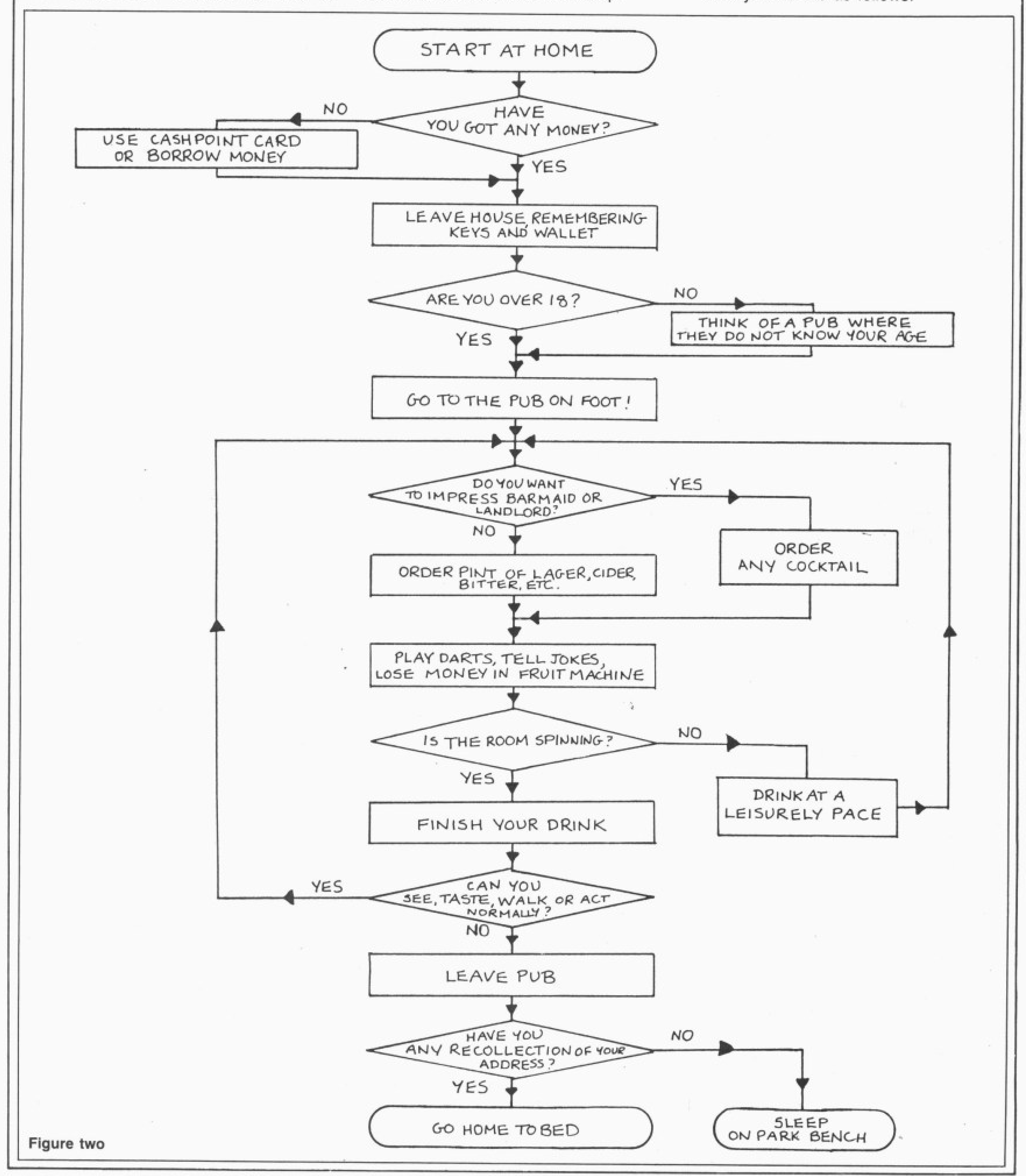
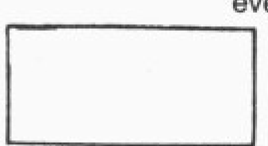


Figure two

1) Start/Stop. As it says; placed at the beginning and the end.

2) Decision. This represents a break in the program flow, and it is generally a good idea to keep these down to binary decision (ie yes/no), as this makes it easier to code.

3) Process. That is to say, everything else.



Figures Two and Three are two flowcharts we drew up as an example. The first, not totally serious, has nothing at all to do with programming (except in that it represents a process not totally unfamiliar to most programmers!), but should serve as a general example. The second is a flowchart for a program we will publish next month, to clear the screen in a slightly different way. More on that later after a closer look at Figure Two.

Flowcharting

The first thing you will notice about the flowchart is that it is very easy to follow. This is one of the fundamental advantages to flowcharting a program. It is very difficult to get lost in the programming provided you have an adequate flowchart next to you.

We say adequate because we have seen someone try to write a *Defender* program from a flowchart with six boxes, which were "Show Instructions", "Initalise", "Play Game", "Man Dead? (Y/N)", "Print 'Game Over' ", and "Another Game? (Y/N)"! This flowchart, as one can imagine, is of little use to anyone.

The drinking flowchart contains six decisions, ten processes, a start, and two alternative endings. All lines are arrowed (some more than once), all junctions have arrows on all lines entering junction as near to the junction as possible without causing confusion. All decision boxes have their exits clearly marked Yes and No.

All these things should be present on every flowchart, although on a code flowchart the start and end boxes should contain the words START and END respectively and exclusively. Study the first flowchart, understand it and its use, then go on to Figure Three. Look at it and try to understand it before reading on for the explanation.

Right, all those who didn't even glance at the diagram go back and do it again. Done that? Good. Now, the flowchart is very simple, having two loops, but it may aid understanding to realise that the Dragon text screen starts at location 1024 and ends at location 1535. All the routine does is to point to a position along each line (initially at the right hand end), store the address of that position in X (in this case the X register) and then use that as an offset to store a green square on screen. The pointer is then moved on to the next line, by adding 32, and the register is checked to ensure we have not reached the end of the screen. If we have, the position is reduced by one, and, if we have not reached the end of the line, the process is repeated.

START
OFFSET = 31
POINTER = $400
X = POINTER + OFFSET
[X] = 128
X = X + 32
X ≥ $600 (N / Y)
OFFSET = OFFSET − 1
OFFSET < 0 (N / Y)
END

Figure three

Glossary

Try to extend the flowchart so that it covers the screen in black that way, and then does the same in the opposite direction, in green. We will present a program next month that does so.

For now here are this month's additions to the Glossary of machine code terms.

Accumulator — A register within which most of the mathmatical functions are performed within a machine code program.

FILO — First In Last Out.

Flowchart — A diagram designed to ease programming of part or all of a program. The flowchart consists of a series of standard symbols combined in a manner that makes them easily understood.

LILO — Last In Last Out.

Register — In crude terms, a faster 'variable' within the computer. A set of eight or 16 bits (defining a register as a one or two byte register) used for the manipulation of data within memory.

Stack — A pile of numbers! A stack works on a FILO principle, ie, the top number on the stack will be the one put their most recently.

Join us next month for the first piece of actual code.

New software for review should be sent to *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

Cop it!

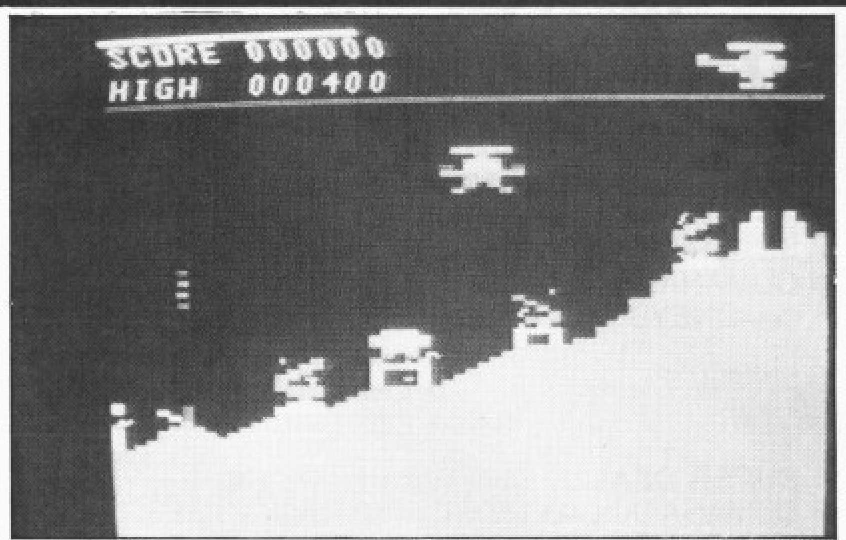
Program: *Copta Snatch*. Blaby Software, Crossways House, Lutterworth Road, Blaby, Leicester.
Price: £3.99

A few days ago I sat at my keyboard and said "Right, it's time to write this months reviews. Perhaps before I do it though, I'll have a quick game of *Copta Snatch*, just to wake me up!" By about one in the morning, into my millionth game of *Copta Snatch* for that evening I was in no state to write my name, let alone a review of this superb game.

Strangely enough, the same thing happened the day before yesterday. I sat down, decided to have a quick go at this game, which, incidentally involves flying a helicopter "Skramble" like (or to be more accurate, "Super Cobra" like), over a terrain defended by guns, laser turrets, force fields, etc, in an effort to reach the enemy's plans, and suddenly found it was some ungodly hour near dawn. The reviews still remained unwritten.

Yesterday, I sat down, loaded up the game with the best of intentions, played its Mode 24 flicker free graphics for several hours and completely forgot all my cares and my deadline, being carried away as I was in the crystal sound and smooth movement, and speed.

It's surprising, therefore, that after so much play, it should only have been tonight, after two and a half hours of hammering on the keyboard instead of using my Joystick because, you see, the sheer



speed of the game makes joystick control very difficult. I eventually got past the first force field and into the next stage of the game — a cave rather than just a landscape with new defenses, into which I managed to probe about three millimetres!

It's now five to eleven at night, the deadline is the day after tomorrow, I'd better get someone to hide *Copta Snatch* now, thinking of which, I don't half fancy a game. No, no, I mustn't . . . Oh heck! What's a deadline anyway?

Jason Orbaum



Rock steady

Program: *Draconian*, Microdeal, 41 Truro Road, St Austell, Cornwall, AL25 5JE.
Price: £5.70 (inc P&P)

FOR MY second rave this month I have picked on Microdeal's *Draconian* which is a brilliant, inspired cross between *Sinistar*, *Trans-Am*, and *Time Pilot* that flourishes as an original and addictive game in its own right.

The game puts you in charge of a space ship which remains centre screen as the play field moves around it in the opposite direction to that in which you are pointing (a-la *Trans-Am* and *Time Pilot* and *Sinistar*). The idea is to free all humans within the galaxy. Each is held within an enemy base shown on the radar. A base consists of three or more force-fields enclosing one or more space people. The force fields are linked by generators and it is these which must be destroyed to remove the base.

Also in the galaxy, just to make things harder, are space mines, which, once shot, implode for a couple of seconds making it very easy to fly into their explosions which are as fatal to your ship as the mines themselves. The mines are accompanied by space rocks which are really pretty feeble and easy to destroy — this makes it even more annoying when one is flown into!!

Also in the galaxy, just to make things even harder, are Dragons, which chase you and attempt to kill you in the traditional Japanese style (kamikase). It only takes one shot to cause a Dragon to warp out but they return with all due haste.

The last enemy is the Draconian himself, so big, and so terrifying that he even shows up on the radar! He doesn't appear until quite late, at which point its a good idea to get off the screen, providing you've rescued all the space people that is! When he does appear on the screen though, (and realisation dawns that his wing span is about ten of your ships . . . and that's one wing, and he's indestructable), most people just drop the joystick and their bottom jaw simultaneously and watch their ship vapourise on his hull leaving not a scratch.

What can I say, the graphics are stunning, the game plays at a comfortable speed which I initially thought was too slow, but is in fact just right, and the title page is almost worth the money for the game anyway!!

I have yet to finish section three (by which point the generators are shooting back!) but I will . . . I will . . .

Jason Orbaum



Freaky Fables

Program: *Zak's Son*, Cable (via Computape), 27 Coombe Road, Southminster, Essex, CM0 7AH.
Price: £2.99

ONCE upon a time, there was a happy, happy land, where Dragon Data still existed, where all the people were friendly and full of goodness and smiled even when it was raining and where the people were so primitive they still thought that *Pimania* was a good game. And all day long these happy, happy folk, sang jolly songs about life, love, and the legend of the dongle.

But also there dwelt in the land of Evil Wizard and he began to spread rumours that there was a land far away across the water where there was a machine with really good games called the Spectrum, for lo, there were no Spectrums in this happy, happy land. And then, the Evil Wizard turned his wicked hands and Dragon Data went bust and lo, all the people did panic and scream and try to sell their Dragons through the pages of the scroll known as "Popular Computing Weekly."

But all was not lost in the land for there also existed the Good Witch Cablette who had heard that one of these games for the Spectrum was a version of the arcade game mentioned in the legends of the elders called *Zaxxon* and lo, she said "Let there be *Zak's Son* so that all the little folk of the land can once more dance and sing and do all those happy sorts of things."

Word of her goodness had, however, reached the Evil Wizard and verily he was filled with wrath and he decided not to stop this spell of good, but to alter it, for lo, he was as cunning as he was evil, and that's pretty cunning, and verily he did speak these words . . . "Yes, let there be *Zak's Son*, but let it be boring, slow, and generally disappointing."

And lo, throughout the land adverts did appear on trees for *Zak's Son* and once more the people did dance and sing and sent off for their copies and behold, on the day after they had given up getting up early to meet the post it didst arrive on their doorsteps (for Sod's Law was still present in the happy happy land even if Sinclair were not). And lo, the people didst load the game into their Dragons, and lo, and it was not good.

And yea verily the moral is . . . Those who bring out totally unimaginative arcade copies deserve to receive cynical reviews.

Jason Orbaum



If you've got a technical question write to Brian Cadge. Please do not send a SAE as Brian cannot guarantee to answer individual inquiries.

Dragon Answers

Over Loading

PLEASE could you tell me if it is possible to load a graphics screen into another graphics screen leaving the first screen graphics on, but under the second screen. If you could help I would be most grateful.

Duncan Chambers
30 Park Avenue
South Shields
Tyne & Wear

THE SIMPLEST method of loading one screen 'over' another, without resorting to machine code, is to use a program such as the one shown below. Basically, this loads one picture into the first four graphics pages, and the second into the next four pages. The 'GET' command is used to take a section of the picture from the second screen and store it in the array 'A'.

The 'PUT' command is then used to overlay this on to the picture on the first screen.

This method works fine in the two colour modes, but for four colour modes change the 'AND' in line 70 to 'OR'. The areas where colours overlap will give interesting effects.

```
10 PCLEAR 8
20 PMODE 4,1:SCREEN 1,1:
   COLOR 0,1:PCLS
30 CLOADM "PICTURE1": REM
   Load picture — Saved by the
   CSAVEM "PICTURE1",1536,
   7679,0 command
40 PMODE 4,5
50 CLOADM "PICTURE2", 6144:
   REM Load at offset
60 DIM A(1230):GET(0,0)-(255,
   191), A,G
70 PMODE 4,1:PUT(0,0)-(255,
   191),A, AND
80 GOTO 80
```

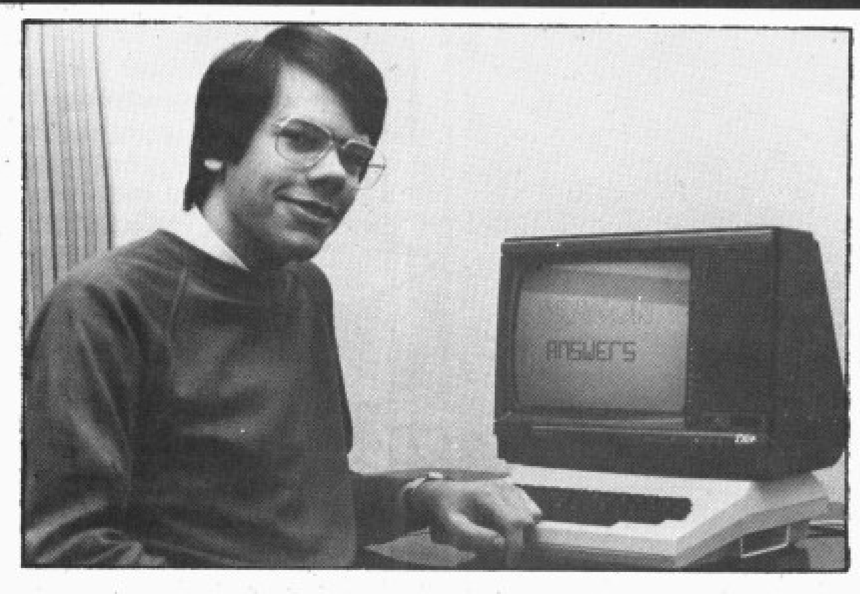
Remote Control

I AM trying to write a machine code program to enable my Dragon 32 to be run entirely from a ADM3A terminal. The terminal has a 80 × 24 display and I would like to take advantage of this.

I have a Maplin RS232 port and have run a small program from Basic to check that the terminal will communicate with my Dragon. I need to know where to place the code of the received character so that the Dragon thinks it is an input from its own keyboard, and also how to copy the output to the screen to the terminal. Hope you can help.

D. Pendleton
103 Mersey Road
West Bank
Widnes
Cheshire WA8 0DT

IT SHOULD certainly be possible to use a Dragon from a remote terminal (for text I/O only of course). One method is to patch the vectors at 362 and 359 which are the links for character input and output respectively. These are normally initialised to 'RTS' instructions. See the Firmware page in DU 11/85 and 2/86 for details of how to patch these routines.



Multi Channel

FOR A while now I have been struggling with multi-channel sound output, (eg, Composer), via my Dragon's D/A converter. Although I can quite easily produce sound through one channel, I can find no way of outputting through more than this. Could you please help me with this problem?

Adam Law
24 Farmington Road
Benhall
Cheltenham
Gloucestershire GL51 6AT

A POINT much mooted by Dragon-bashers is the micro's sound capabilities (or lack of them). The Dragon has only one hardware sound channel (not counting single-bit sound) which is accessed via the D/A converter. Programs such as Microdeal's 'Composer' use a software technique involving producing mixed waveforms from the D/A — each 'channel' has a different waveform. The sound still only comes from one channel but appears to be in more than one voice.

The techniques involved are quite complex and the simplest solution is to buy a copy of 'Composer' which, after all, will produce stand-alone machine code.

Type Writing

PLEASE could you tell me if there is a way of getting whatever is produced on the screen, also produced on the printer, without having to use #−2 in every print command. For example, the simple program below.

```
10 PRINT "DRAGON 32"
20 GOTO 10
```

I am asking this because at school I am taking a computer studies course, where I have to produce five programs written in BASIC, in the period of two years. But the program has to be produced as a listing and also as a RUN copy on the printer.

Please could you let me know whether there is a solution to my problem.

Neil Peet
12 Newton Close
Leyland
Lancs, PR5 3TS

THE FOLLOWING short listing can be run prior to loading your programs, or added to the start of any of them. It causes a character sent to the screen to be echoed to the printer as well as the screen. You can still send characters to the printer only, by using PRINT −2 as normal. The program can be disabled by typing POKE 359,57

```
10 CLEAR 200,32759
20 FOR I=0 TO 7:READ A:POKE
   32760+I,A:NEXT
30 DATA 13,111,39,1,57,126,
   189,26
40 POKE 359,126:POKE 360,
   127:POKE 361,284
```

Making Contact

I OWN two Dragon 64s which I have linked together via the RS 232 ports in the following way: Pin 1 to 1, Pin 2 to 6, Pin 3 to 3, Pin 4 to 5, Pin 5 to 4, Pin 6 to 2, and Pin 7 to 7.

Firstly could you let me know if these are correct, and secondly could you please tell me how to send programs and data from one computer to the other as the DLOAD command only sets one computer to receive. I have tried the small programs given in the Dragon 64 supplement with no success.

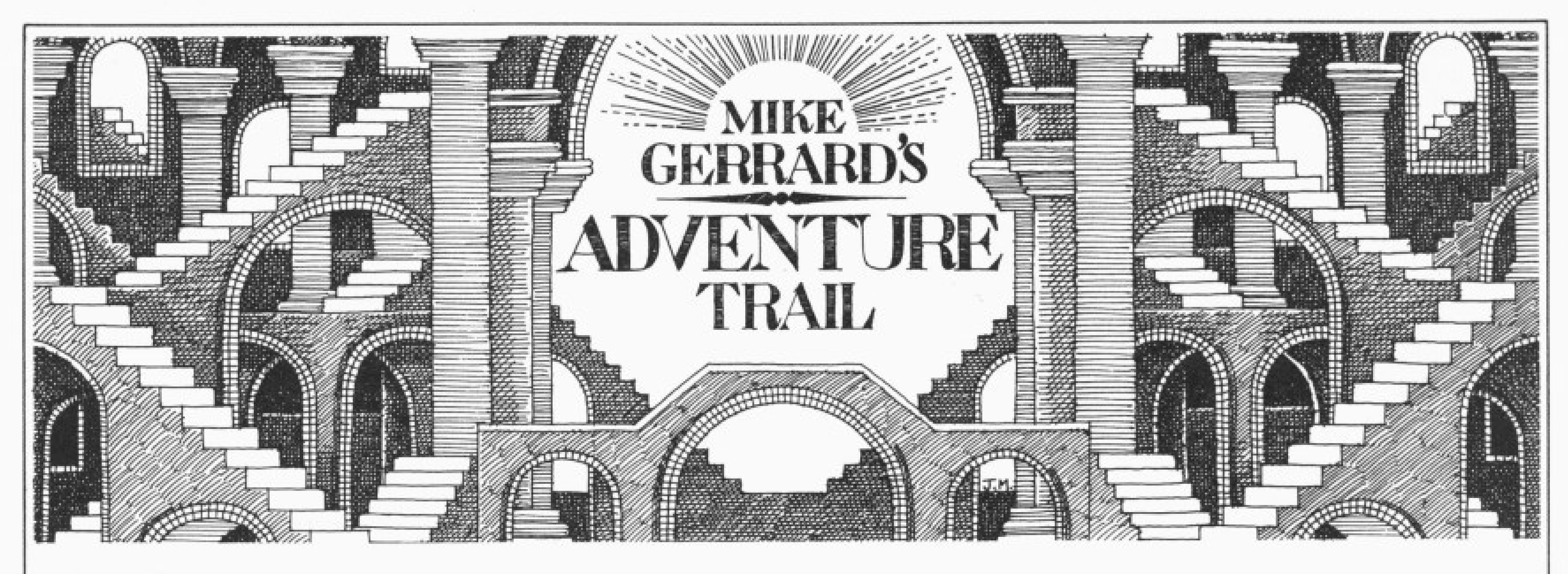
Mr. P. C. Kinson
8 Moreau Walk
George Green
Slough
SL3 6RD

A SUITABLE lead for connecting two 64s together can be made by connecting the pins in the following way: Pin 1 to 1, Pin 2 to 6, Pin 3 to 5, Pin 5 to 3, Pin 6 to 2.

The problem with the DLOAN command is, as you have found, there is no equivalent DSAVE command. The format required is not simple and in general it is best to avoid trying to use it. With a lead made up as suggested above, the example programs in the supplement should work and can form the basis of a more sophisticated communications program.

Whoops!

FINALLY, I have received a number of letters regarding my answer to John Booth in DU Jan '86. Many of you noticed my gaffe in using the variable FN$ to hold the disc filename, this should have course read F$ as 'FN' is a reserved word in Dragon basic and so its use as part of a variable name will cause a syntax error — sorry!



LET'S DEAL with some readers' letters first, before going on to some news which I know will interest lots of people who have written in to me in the past.

First out of the lucky dip is D Depree of 11 Sturry Street, London E14 6DB, who offers help to anyone stuck in *Trekboer* and *Juxtaposition,* but in return needs a favour himself . . . or possibly herself. DD has bought one of the Phoenix twin-pack games, where you have to discover a code from playing an arcade game before being allowed to play the adventure on the second tape. I never liked this approach, and DD has been unable to get through the arcade game, leaving an unstartable adventure. The pack was called *The Emperor Must Die,* so can any of you code-crackers or arcade addicts out there come to the rescue?

Operation Safras

Plenty of you have completed *Pettigrew's Diary,* but as yet no one has claimed to have got through the second part, *Operation Safras.* "After answering all the questions on the note given to you by Rhythma," says Justin Field, "what is the code you have to enter to proceed?" Any help to me or to Justin at 2 Barnet Green, Hatfield, Doncaster, South Yorks DN7 4HL.

Help of a slightly different kind is needed by S J Gamble, 39 Plaistow Avenue, Hodge Hill, Birmingham B36 8HQ. It may well be psychiatric help, as the Gamble household thinks the Adventure Trail should be five pages long every month, but their real problem lies with *Franklin's Tomb.* The SAVE facility on their copy causes the program to crash, which I haven't heard anyone mention before. Has any reader encountered the same problem and found a way round it? Or maybe you've finished the game and would like to pass a copy on. The Gambles will manage to amuse themselves in the meantime as they're stuck in *El Diablero,* but who isn't? How to get to the cave in the cliff, and how to get the feather from the eagle they ask. Well, to rewrite my favourite Everly Brothers song: MAER DSIO DOTE VAHUO YLLA.

To prove that adventure playing can definitely be a family activity, just consider the Higgins home in Bootle, Merseyside. Philip's asking about *Pettigrew, Franklin* and *El Diablero,* while his brother is stuck in *Wings of War* and Dad has shown who's in charge by just completing *Return of the Ring.* He found a bug in the program, as after managing to kill Gron, the program crashed whenever he tried to enter a village. Could be Gron's revenge, I suppose, being dealt out by his brother, Groff. Anyway, Higgins senior's advice is to forget Gron and take your gear to the Chamber of Time to get into the final stages which is a mini-adventure with "brilliant graphics."

Juxtaposition is the adventure that's dominating the postbag at the moment, not surprisingly, with satisfied customers galore — both those who've solved it and those who are struggling but still enjoying it. You'll probably know already from *Dragon User's* news pages that the sequel might be ready by Easter. Maybe Dean Douglas of Blackburn will have crossed the Blue Mountains by then. The way through is in the Brown Lands: TFAH SANW ODRE VIR AYB. A hint on the game from Frederick Jowett of Burnley, who's solved that and *Trekboer,* both of which he thought were excellent, though he says *Trekboer* didn't have as much behind it as he expected. Anyway, in *Juxtaposition* Frederick says that while you're outside the White City (I thought that was a dog track), you should enter any building you can as you might find something interesting.

Franklin

Carl Truett is trying to find something interesting, and that's a copy of *Franklin in Wonderland.* You may recall that Salamander released a version of this without inlay and instructions for a fiver, but now it seems to have disappeared from the market, as indeed does Salamander. Microdeal are selling some of the former Salamander titles but not this one. Anyone with a spare, contact Carl at 11 Hayden Road, Rushden, Northants NN10 0HX.

Stephen Cogan of 674 King Lane, Alwoodly, Leeds LS17 7AR is keen on hearing from Dragon owners in the Leeds area, particularly adventure players, to see about setting up a club of some kind, so contact Stephen if you're interested.

I'd like to remind readers to enclose their address when writing, which M D Waller didn't, so his offer of help to people on several adventures is rather difficult to pass on! So was the answer to his question (a common one this) about getting past the Nighteye Droid in *Juxtaposition.* You need a flash of inspiration on that one.

Help on *Juxtaposition* is available from Gareth and Geraint Edwards, and you don't need to be an adventurer to work out where they live. The address is 10 Harlech Court, Hendredenny, Caerphilly, Mid Glamorgan CF8 2TR. The brothers Edward say they'll advance saved games to a desired position if you like, or just help on any particular problem, provided you enclose sae, which of course applies when writing to anyone who's kind enough to offer help to other readers. Gareth and Geraint completed the game in 10 days, and two of those were spent trying to solve the puzzle of the caretaker, which I would have thought was one of the easiest of the lot, so it goes to show how different puzzles do fox different people.

If you're foxed in *Ring of Darkness* then some hints from Garrick Alder. He says that if you're thinking of buying a raft to get to the island, wait till you can afford to buy two, then put one on each shore in case you die and are reincarnated on the opposite side from where you left the raft. That's if you can't afford a hovercraft. Garrick also recommends the coward's way out in trying to deal with the monsters in the dungeons — break into the program and edit their strength to zero! Have my readers no shame?

More honest advice on *Return of the Ring* comes from Jonathan Harrop of Wantage, who says that at the start you must continually kill monsters to gain experience and raise your Gestalt Level, which causes the shops to sell more equipment, including the passes that you need. Also try trading with the monsters in the Forest Moon, as some of them give crystals away for nothing.

A couple of months ago I reviewed an adventure called *Castle Blackstar* and rated it very highly indeed. A little gremlin crept into the review, which publishers SCR Adventures have asked me to mention, and that's that the disc version is only available for the 64K Dragon, and not its little brother. It's good to know that at least one reader shares my enthusiasm for *Castle Blackstar,* and that's Pauline Hampson of 10 Cherry Lane, Lawton Heath, Alsager, Stoke-on-Trent ST7 3QZ. Pauline's completed lots of adventures, so knows what she's talking about, and she says the SCR effort "really

is incredibly good." So good that she's stuck and needs help . . . can the reader who told me about the adventure, and whose letter I can't find, help Pauline in any way? Or anyone else, for that matter.

Now for the news that I mentioned, which should please all those readers who have written in over the months asking if there is any hope of a tape version of *Colossal Cave Adventure* for the Dragon. Well at last there is, although inevitably it has had to be abbreviated just a little in order to cram it all in. Still, at least you'll be able to discover for yourself what everyone on virtually every other micro has known for ages — that *Colossal Cave Adventure* is the granddaddy of all adventures.

The storyline remains the same — can you enter the genuinely colossal underground cave network and retrieve the various treasures that are hidden in there? Getting into the caves isn't much of a problem, but map-making is essential if you're to find your way round and also get out again — that's once you've got past the first major obstacle, which is a giant green snake that rears up and hisses at you in the Hall of the Mountain Kings. Don't try and deal with it yourself, is my only advice on that one. The dragon is a different kettle of monster, though. You'll also meet a bear, a droll troll demanding a toll, a pirate who insists on pinching your hard-earned treasure and hiding it in the most devious of mazes, a clammed-shut clam, hostile dwarves that pop up out of nowhere and throw things at you, and a host of other problems.

It's a pity that the lengthy location descriptions, which were one of the attractions of the original, have had to go, but with the Dragon's bulky text display (not redefined) it's maybe just as well as some of them would take up several screens. However at least you do get a look at this most famous of all adventures, and if maybe a few of the problems and their solutions seem familiar (like the bear and our old friend the burning torch) then remember that these were the originals. There's a score but no save routine, which is also as it was in the original mainframe version.

One practical tip — I had loading trouble with the game till I eventually turned the cassette volume down very low indeed. The only other tip is to give the game a try by sending £6 to Cowen Software Ltd, 23 Bristol Avenue, Levenshulme, Manchester M19 3NU. And that's the end of the colossal adventure column for another month, except to say that I've recently been given a sneak preview of a kind of arcade-adventure game written by one of our readers and which Microdeal will be publishing in the near future. I'm sworn to secrecy about it, but I will say that it's brilliant, with more packed into the program than I would have ever thought possible. I'm dying to write about it, but you'll have to wait till my lips have been unsealed.

Adventure Contact

To help puzzled adventurers further, we are instituting an Adventure Helpline — simply fill in the coupon below, stating the name of the adventure, your problem and your name and address, and send it to Dragon User Adventure Helpline, 12/13 Little Newport Street, London WC2H 7PP. As soon as enough entries have arrived, we will start printing them in the magazine.

Don't worry — you'll still have Adventure Trail to write to as well!

Adventure ....
Problem..
....
Name ....
Address..
....**Mar 86**

Adventure Contact

Adventure Syzygy **Problem** I have all the co-ordinates, but how do you use them at the transporter? Also, how do you get to the planet? **Name** Clayton Poole **Address** 58 Castle Drive, Northborough, Peterborough, Cambs, PE6 9DL.

Adventure Black Sanctum **Problem** Please could anyone supply me with a list of the commands? Also, how do I get out of the rugged mountain? **Name** John Scullard **Address** 12 The Mount, Teignmouth, South Devon, TQ14 8NZ.

Adventure The Ket Trilogy/ Final Mission **Problem** How do you get past the second door after spraying the aerosol? **Name** Eifion Llewelyn **Address** Maes-yr-odin, Park Road, Ynystawe, Swansea, SA6 5AP.

Adventure Juxtaposition **Problem** How do you kill the night-eye droid? Is there a hint sheet? **Name** Steven Slade **Address** 37 Waterloo Road, Bramhall, Stockport, Cheshire, SK7 2NS.

Adventure Barons of Ceti V **Problem** I can't get away from the JKL assassin droid, or past it. **Name** Phillip Dew **Address** Rosellou, Winchester Road, Waltham Chase, Southampton, Hants.

Adventure Ring of Darkness **Problem** Any help please **Name** Karl Carrier **Address** 54 West Ham Close, Basingstoke, Hants, RG22 6PH.

Adventure Jerusalem Adventure 2 **Problem** How do you be religious at Western Wall? What are the magic words? When do you use them? **Name** John Haining **Address** Arranview, Somerville Street, Catrine, Ayrshire, Scotland, KA5 6SQ.

Adventure Juxtaposition **Problem** I cannot get past seemingly multiplying JKL assassination droid. Please tell me how I can do this — if possible send hint sheet. **Name** Simon Goodwin **Address** 15 St Stephen Rd, Penketh, Warrington, Cheshire.

Adventure Sea Quest **Problem** Getting Scuba gear from the Clerk **Name** Gareth Ashenhurst **Address** 49 Fosseway, Syston, Leicester, LE7 8NF.

Adventure Syszgy **Problem** Don't know how to beat Voder. Can't set co-ordinates right. Can anyone help? **Name** Stuart Gillicott **Address** 65 Yewtree Cres, Melton Mowbray, Leicestershire, LE13 1LN.

Adventure El Diablero **Problem** Where to dip the twig **Name** Gavin Griffin **Address** 58 Did Bawn, Tallaght, Co Dublin, Eire.

Adventure Madness and the Minitor **Problem** Everything **Name** Gavin Griffin **Address** 58 Did Bawn, Tallaght, Co Dublin, Eire.

Adventure Juxtaposition **Problem** Cannot get the white key card off the caretaker and cannot find the mask. **Name** Mark Coops **Address** 16 Willows Drive, Meir Heath, Stoke-on-Trent, ST3 7LZ.

Adventure Juxtaposition **Problem** Have sender unit and deeds of Brown, but always die from Brown Fog. Can someone send a map? Also what use is cryobelt and Transmat receiver? **Name** David Eggelden **Address** 9 Tithe Road, Chatteris, Cambs, PE16 6SL.

Adventure Return of the Ring **Problem** How to get the grain out of the human village. **Name** Steven Atkins **Address** 306 Berecroft, Harlow, Essex, CM18 7SH.

Adventure Juxtaposition **Problem** How do you get out of the first building without being shot by the first droid? **Name** Richard Tylar **Address** 11 Madema Park, Tunbridge Wells, Kent, TN2 5SX.

Adventure Return of the Ring **Problem** We can't get the blue pass to get out of the maze at the beginning. **Name** Emma Breedon **Address** 21 Welbeck Road, Yeovil, Somerset.

Adventure Juxtaposition **Problem** How do I get out of the Emerald Tower with the Emerald? What use is the girl in the lasertheque? **Name** S N Thompson **Address** Firld View, Brize Norton, Oxon, OX8 3PU.

Adventure Ring of Darkness **Problem** How do I get the key off the Jester? What do I do when I have the four rings? **Name** Paul Gibbons **Address** 23 Crosslands, Caddington, Luton, Beds, LU1 4EP.

Adventure Trekboer **Problem** Cannot pass the force field **Name** J Wright **Address** 31 Oak Way, Cleethorpes, South Humberside, DN35 0RA.

MORE TERRIFIC PEAKSOFT SCOOPS!

PRISM MODEM 1000/2000

Come and join the fun on Micronet and Prestel!

There are now FOUR HUNDRED THOUSAND pages to explore, offering inter-active games, nationwide "chat" lines, advice on computer problems, tele-shopping, a micro market, electronic bank accounts, your own computer mailbox . . . the list just goes on and on.

The Prism Modem uses your phone line to link your Dragon to special mainframe computers throughout the country — the special cheap call rate costs just 40p an hour.

OUR BREAKTHROUGH PRICE IS JUST £64.95 complete with all leads and "plug-in-and-go" cartridge software, and including a FREE 3-month subscription to Micronet/Prestel.

PLUS — A PEAKSOFT EXCLUSIVE! We're compiling a Dragon-only Prestel directory, to help you get in touch with Dragon fans everywhere. Every Peaksoft modem customer can receive a FREE copy. (If you're already on Micronet, check page 323000191 for details, and other Dragon news.)

ONE DAY EVERY HOME WILL HAVE ONE — WE'RE OFFERING YOU THE FUTURE!

∞∞∞∞∞

TOUCHMASTER GRAPHICS TABLET with FREE GAMES worth over £39!

We've slashed almost TWO-THIRDS from the Touchmaster's original price of £149! It plugs into your Dragon's cartridge port, allowing you to draw, and save, incredibly detailed pictures in any available colour, using the supplied stylus. There's a through port, so disk drives can still be connected.

If you saw the review in last month's Dragon User, you'll know just what a stupendous product this is!

OUR INCREDIBLE PRICE IS ONLY £49.95 + £3 CARRIAGE/INSURANCE! And as part of this super deal, we even include 5 dedicated Touchware games, worth over £39!

∞∞∞∞∞

TATUNG TP100 DOT MATRIX PRINTER

This is the one we use — that's how highly we recommend it! Just look at these incredible features!

★Standard friction AND tractor feeds ★Graphics ★Elite ★Pica ★TRUE descenders ★Condensed ★Large lettering ★Subscript ★Superscript ★Italic ★Foreign fonts ★Proportional ★Underlining ★Double strike (better than some pricey printers' "near letter quality"!) ★100 letters-per-second printing ★Epson compatible ★Standard ribbon obtainable from office supply shops.

But we've saved the best news to last — WE'RE OFFERING THIS INCREDIBLE PRINTER FOR JUST £199.95 INCLUDING A FREE DRAGON LEAD!

∞∞∞∞∞

PEAKSOFT BRAND NEW HEAVY DUTY POWER SUPPLIES £14.95. Transformer only, £11.95. Check around — you won't pay much less for "reconditioned" units!

GENUINE DRAGON DATA DISK DRIVE COPPER-BOUND INTERNAL POWER SUPPLIES. £14.95. We tracked down the last in the country and bought the lot! Safeguard the future use of your disk drive while stocks last!

LEADS: cassette £2.50, aerial £2.50, printer £11.95. DUST COVERS £2.95.

BINDERS for 12 Dragon Users: £4.40 (Supplied unmarked, with self-adhesive blank label.)

QUICKSHOT 2 AUTOFIRE with DRAGONISER £14.95. Unlike many conversions, our unique Peaksoft Dragoniser does NOT invalidate the joystick manufacturer's guarantee. Recommended for arcade game use.

★★NEW★★ COMPETITION PRO-5000 with DRAGONISER £21.95. When only the best will do — the ultimate, Kempston-designed, micro-switched joystick. Recommended for arcade game use.

PRO-STICKS £9.95 pair, £5.50 each. Genuine twin potentiometer floating joysticks, suitable for ALL Dragon games. (This type is necessary for Tim Love's Cricket and Worlds of Flight.)

To order: Just note your name, address, computer and goods required on the back of your cheque or postal order. Access/Visa card-holders may phone their order to 0636 705230 at any time, day or night. Prestel subscribers may leave credit card orders in our mailbox — 636705230. All goods except the Touchmaster are POST FREE. We supply by return of post, subject to availability. Personal callers welcome — please phone first so that we can have your order ready. CASH ON DELIVERY on all orders over £40 — please send at least £5 deposit and pay the balance to the postman (sums over £50 must be paid at your local Post Office).

PEAKSOFT

48 QUEEN STREET, NEWARK, NOTTS, NG24 3NS
Tel: 0636 705230



MAKING YOU GLAD YOU BOUGHT A DRAGON!



BERND KNECHTEL SOFTWARE

the company which only produces good machine code tools and utilities for your Dragon instead of worse games, proudly presents:

DISK SUPPORT TOOL 1.5
A must program for every Dragon user with Disk Operating System. [*,D] — £15.

LOGO EXTENSION 3.3
Use the graphic features of the language Logo from your Dragon Basic (with its own fast arithmetic routines, it doesn't use the slow ROM routines). [*,D,C,I] — £15

COMMUNICATION SOFTWARE 1.0
The by all means necessary aid to do any kind of serial data transmission. [*,D,C,I] — £5

EQUAL CHECKER 1.0
The program to overcome all typing errors. You'll enter a new world of string comparison. [*,D,C.I] — £10

TASK MASTER 1.2
Multitasking for your own programs, little machine code knowledge required. [*,D,C,I] — £10

*=send SAE and two international answercards for further details. D=available on disk. C=available on cassette. I=free assembler source listing supplied with the program to allow you to make your own changes and to use it easily from your own programs.

How to pay? Add £2 to your order for postage and packing (by air mail) and remit the money (pounds sterling) to my account in West Germany:

Country: West Germany, bank name: Volksbank Remscheid, counting code: 340 600 94, account no.: 10 81 688 0, account owner: Bernd Knechtel.

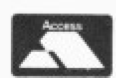
Please state on the remittance your name and address and send a separate letter with your order to: Bernd Knechtel, Arnold-Wilhelm-Str. 9, 5630 Remscheid 11, West Germany.

S.P. ELECTRONICS

Strike Control Joystick	£9.95
CPA 80 Dot Matrix Printer, inc. Printer Cable	£228.00
Parallel Printer Cable	£12.90
Cannon 160 CPS NLQ Printer, inc. Printer Cable	£299.00
Green Screen Monitors	£85.00
Disk Drives from	£120.00

Large range of software available. SAE for free list.
Large range of spares available

Also complete Dragon repair service



S.P. ELECTRONICS
48 Limby Road, Hucknall, Notts
(Nottingham 640377)



SPRITES FOR THE DRAGON

- ★ UP TO 128 NON-DESTRUCTIVE SPRITES
- ★ SIZE SINGLE PIXEL TO 1600 PIXELS
- ★ COLLISION DETECTION
- ★ AUTOMATIC ANIMATION
- ★ AUTOMATIC MAZE RUNNING MODE
- ★ AUTOMATIC JOYSTICK/KEYBOARD CONTROL
- ★ ENHANCED SOUND FACILITIES
- ★ TEXT IN ALL MODES, TRUE LOWER CASE ASCII
- ★ REDEFINABLE CHARACTER SET
- ★ MIXED TEXT AND GRAPHICS IN ALL MODES
- ★ AUTO REPEAT KEYBOARD
- ★ DOZENS OF POWERFUL NEW COMMANDS
- ★ SIX FREE DEMONSTRATION PROGRAMS
- ★ COMPREHENSIVE MANUAL

WHAT THE MAGAZINES SAID

DRAGON WORLD: "Quite simply the best utility on the market"
PCW: "Excellent" and "Superb"
DRAGON USER: "This is a very professional program and can certainly be recommended"
PCN: "Fantastic . . . if you've got a Dragon, what on earth are you doing without Sprite Magic?"
PCG: "Go out and buy it, it's worth every penny" (They were talking about the full retail price of £17.25)

★ ★ SPECIAL OFFER ★ ★

Sprite Magic on Cassette	**£8.65** all inclusive
Disc (Dragon DOS only)	**£9.75** all inclusive

★ ★ PLUS FREE with orders received before 30/4/86 ★ ★

YUMPING YOSSER

Fifteen screens of addictive fun with Yosser in his quest to rescue girl-friend Daisy. You too can be a head-banger!
(Available separately for £2.99 all inclusive)

Send cheque or PO or phone Access/Visa details to:

KNIGHT SOFTWARE (Dept DU)
24 Badger Lane, Ingleby Barwick, Stockton-on-Tees
Telephone (0642) 762540

Firmware

Brian Cadge explores the Dragon's ROM in a special series which builds up month by month into a firmware manual.

Dragondos Firmware Memory Map

The Firmware data locations detailed below may be used for other purposes by the Basic ROM when Dragondos is not installed, for example the USR routines table. Dragondos also uses RAM from 1536 to 3071, moving graphics page one to address 3072.

234 Floppy Disk Controller Macro Command Byte. This is the byte sent to the hardware to specify what operation is to be performed. See Manufacturers data sheet for details.

235 Disk Drive number (1-4). The drive to be used in a sector read/write operation.

236 Disk Read/Write TRACK.

237 Disk Read/Write SECTOR.

238/239 Disk Read/Write sector Buffer address. This is a 256 byte area of memory from where the sector is to be written, or to where the sector is to be loaded.

240 Floppy Disk Controller Hardware Error Status Byte. This is the error number returned by the hardware to be converted into a Dragondos error code.

241 Current File Number. The number of file (1-10) most recently accessed.

244 Number of disk drive sides and tracks for current drive. Coding is as follows:
00 = 1 side, 40 tracks
01 = 2 sides, 40 tracks
FF = 1 side, 80 tracks
FE = 2 sides, 80 tracks
The format of a disk is taken from the directory track on the first access to a disk after switch on or reset.

245 File Read/Write Flag. A zero value specifies a file read operation, non-zero specifies file write.

246 Disk I/O in progress flag. A non-zero value signals that disk I/O is continuing and that the motor should not be turned off by the IRQ routine.

1541 Interrupt countdown to disk motor off. The Dragondos IRQ routine is used to decrement this location if it is not already zero. When it reaches zero the disk motor is switched off.

1544 Disk Auto Verify on/off flag. A non-zero value causes the disk to be read after a write to verify that the data has been saved correctly. A zero value disables this feature. The default setting is ON.

1546 Current default disk drive number (DEFD). This is the drive to be used by operations which do not specify a particular drive number. It is set from basic by the DRIVE command.

1549/50 AUTO command line number. The current line number being used by the AUTO command.

1551/52 AUTO command increment value.

1553 Program LOAD/RUN flag. A zero value indicates that the program is to be loaded, a non-zero value indicates that the program is to be loaded and RUN.

1555 AUTO command on/off flag. A non-zero value indicates that the AUTO command is being used.

1556 ERROR command on/off flag. A non-zero value indicates that the ERROR GOTO trap is active and errors will not cause the program to stop.

1557/58 ERROR trap line number. The Basic line number of the error routine.

1559/60 Line number of last error (ERL).

1561 Error code of last Basic error (ERR).

1618/19 Start address of program loaded.

1620/21 Length of program loaded.

1622/23 Entry address of program loaded (for machine code programs).

1667-86 USR routines address table. The addresses for the 10 USR routines are stored here when Dragondos is installed.

1687-1706 Drive table: 4 bytes per parameter — 1 per drive:

1687-90 Online flag. A non-zero value indicates that the drive is online and has been accessed.

1691-94 Drive Current Track. If the drive is online, this byte specifies which track the head is currently over.

1695-98 Head stepping rate. This should only be changed if slower drives are used.

1703-06 Disk sectors per track. The number of sectors per track on the disk in the drive.

1725 File IOCB's. 10 (one per open file) each 31 bytes long.

2048 1024 bytes of Disk File Sector Buffers — 256 bytes each.

Dragondos Hardware Locations

The Floppy Disk Controller used in the Dragondos interface is a WD 2797. The following Hex locations are used by the 2797:

FF40 Macro command/Drive status Register.

FF41 Track Register.

FF42 Sector Register.

FF43 Data Register.

The disk motors are controlled by location FF48. A zero value turns off the motors. A non-zero value switches on the motors and selectes the particular drive.

Dragondos Firmware Routines

The following ROM routines may be used by the machine code programmer. All addresses are in decimal and obviously apply only when Dragondos is installed.

Write Sector Dragondos 49406
Writes a sector (256 bytes) out to disk. The locations 235 to 239 must be set up correctly as detailed above on entry. The Z condition code will be clear (BNE) if an error has occurred and the B register will contain the error code.

Read Sector Dragondos 49412
Reads a sector (256 bytes) from disk. The locations 235 to 239 must be set up correctly as detailed above on entry. Again the Z code will be clear if an error has occurred with the B register containing the code.

Drive Init Dragondos 49509
Initialises the DOS hardware. On return the status register at $FF40 will have the following meaning: Bit 1 = Index Input; Bit 6 = Write Protect status.

Hardware I/O Dragondos 49513
Vector at 49176
This is a very low-level routine used by Dragondos to send commands to the hardware. This routine is used by the sector read/write routines. A knowledge of the hardware is required to use this routine. The command byte must be set up in location 234.

Format Disk Dragondos 50108
Formats the disk in DEFD drive. All data on this disk will be lost, an empty directory will also be set up on the newly formatted disk.

Get Free Space Dragondos 53581
Vector at 49156
Returns the amount of free space (in bytes) on the current drive (DEFD) in the Floating Point Accumulator.

Convert Sector Dragondos 54033
On entry the Y register should contain the logical sector number which is to be converted into a physical track and sector number in locations 236/237. Logical Sectors start at number 0 at track 0, sector 1.

Directory Disk Dragondos 55868
Produces a directory of the disk in DEFD to the device number in DEVN (location 111), including protection status and free bytes.

Beep Dragondos 56229
On entry the B register should contain the number of 'beeps' to be output. The beep sound is that produced by the Basic BEEP command.

Boot Disk Dragondos 56330
Boots an OS off the disk in DEFD. If the disk is not a valid operating system disk (see below) then a BT error is produced, otherwise the OS boot up program is loaded and entered at location 9730. In either case this routine does not return.

Wait Time Dragondos 56267
On entry the X register should contain the number of milliseconds for the routine to wait before returning. The Break Key is also scanned for.

Classified

PROUD OF YOUR DRAGON? THEN WEAR IT!

Top quality, British made
DRAGON T SHIRTS £3.50
Large centre logo, red on white

SWEAT SHIRTS £7.50
Small logo – left breast – red on white

Post and packing 75p
2 or more 50p per item
Overseas welcome — p&p £1.25

Please state size S, M, L or XL

Cheque/P.O. to
MODERNSOFT
17Balham Close
Rushden, Northants NN10 9JL
Telephone 0933 311498

COMPUTER RATING METHODS HORSE RACING ANALYSIS

Based on statistical facts such as : Weight, Distance, Trainer, Jockey, Going, Prize-money, Course, etc. Nothing left to chance, any horse not worthy of a rating is instantly eliminated during the process of Rating, thus saving you valuable time in finding the BEST BET OF THE DAY, no records to keep or up-date, all races Rated the Professional Way, lasts a life-time. Cassettes available for Spectrum 48K, Dragon 32K, Commodore 64K, £10 each. Floppy Disc for Tandy TRS80 Mod. 4. £12.
Cheques and Postal Orders crossed and made payable to C.R.M., 14 Langdale Place, Newton Aycliffe, Durham DL5 7DX.

REPAIRS. For a free estimate send your Dragon to: M.P. Electronics, The Laurels, Wendling, Dereham, Norfolk. Tel: 0362 87327.

DRAGON 32 tape recorder, 30 games, joystick, £80. Staines 56463.

WANTED OS9 programmers guide, ring anytime, 0656 721469

NEED PROGRAMS WRITING but haven't time? Contact: Robert Thompson, 2 Mount Avenue, Barton, South Humberside DN18 5DW. Tel. (0652) 33155 enclosing £4 (less 80p if supplying cassette). Can also supply programs from any *Dragon User* for £2. On one cassette.

JOYSTICKS

For Dragon/Tandy, top quality Joysticks easier to handle and faster than others costing twice as much, £5.95 each, £10.95 the pair inc. Cheques and POs to: **Peritron, Dept. DU, 21 Woodhouse Road, London N12 9EN.**

PAN ELECTRONICS
REPAIR YOUR DRAGON

£9.50 + PARTS + P&P

★ Timeserved Engineers
★ Best prices on spares
★ Fast turnover
★ Choice of post for speed
★ Full guaranteed work

8 Brynamlwg, Pontyclun
Mid Glam CF7 9AU
Telephone (0443) 226423

COMPLETE DRAGON MEMORY MAP, £1. Tel. Jason 01-500 6432 after 4.30 pm, also programs printed.

ORIGINAL PROGRAMS (23), including Juxtaposition, Backtrack etc. Cost me over £100, yours for £40, also Cotswold RS232 interface with lead, £30. Phone 0206 41401.

WANTED. Drangondos interface. Telephone Slough 28826.

DRAGONDOS disk controller cartridge £30, Microdeal telewriter disc £8, Rainbow writer disc £6. 0400 61175.

DRAGON 32K, games, word processor, Centronics cable, magazines, £60. 0306 711731 (evenings).

DRAGON 32K, cassette recorder, home accounts, manuals, immaculate, boxed, £80. Bury (079 881) 717.

DRAGON 64 Disc drive Dragondos OS9, Dynacall stylograph, RMS flex discs, Telewriter software, Seikosha printer. £300 tel: 01-460 3794.

PERSONAL SOFTWARE USERS' ASSOCIATION

Library and Swap Shop facilities for Dragon users. Huge range of titles. Only £1.50 hire charge for THREE week period.

For details send large S.A.E. to:

Dragon User
P.S.U.A.
19 Lammerton Terrace,
Dundee DD4 7BR

DRAWCASTER DRAGON pools forecasting system, score-draws and homes, British leagues, £6.50. Acepak Software, 3 Brooks Road, Formby, Merseyside L37 2JL.

TANDY CGP115 printer/plotter + 3 rolls, paper, + pens. Hardly used, £130. Phone 0727 25168 after 7 pm.

LISTINGS FOR BASIC and M/C programs 50p; listing or 3 for £1. Send cassette + SAE to Duncan Campbell, 69 Southern By-pass, North Hinksey, Oxford OX2 0LA.

DRAGON 64 plus twin drives and 8 various disks, £250. Telephone (084421) 5857 (Oxfordshire).

WANTED, *Dragon User* before Nov 83 and Jan, June 84, also Premier's, Inform and Scribe, will also consider most business programs. Tel: 0268 775743.

DRAGON 64. D/sided, disk drive, Seikosha GP100A, as new, £315 ono. Phone 061-338 3594.

DRAGON 32, recorder, Ikon, Ultradirve, Voltmace, C.A.D. package, joysticks, Superdragonwriter, word processor cartridge, books, magazines, £175; Tandy DMP110 printer, £120. May split. 0482 444542.

FLOPPY DISK SYSTEM (Dragondos), little used, boxed with disk software, £100. Aylesbury 681547.

MICROSWITCH JOYSTICKS FOR YOUR DRAGON

KONIX SPEED KING	£12.95
SURESHOT	£15.95
COMPETITION PRO 5000	£16.95

ALSO AVAILABLE

QUICKSHOT II	£10.95
QUICKSHOT IV	£12.95
QUICKSHOT V	£12.95

Please send ch/po's to
O. J. SOFTWARE
273 Mossy Lea Road, Wrightington,
Wigan, Lancs WN6 9RN
Access orders Tel (0257) 421915
Prices inc U.K. p & p
Overseas add £1 Europe, £2 others

AMERICAN "Color Computer Magazine" bumper bundles of back copies, 10 back issues £9.95 inc. 6 for £6.95 inc. Loads of programs and information for Tandy Color and Dragon Users. Cheque/Visa/Access to Elkan Electronic, 11 Bury New Road, Prestwich, Manchester M25 8JZ. 24-hour hotline 061-798 7613.

DRAGON 32. Joysticks, cassette player, 10 games, instruction manual, £45. Telephone 01-458 3691.

SWAP SHOP. A new club for Dragon users, swap software, fun competitions, and a monthly newsletter. Want to know more? Details: Dalesoft, 168 Pottersfield, Harlow, Essex.

DRAGON 32K plus Dragon disk drive, cassette recorder, joysticks, Seikosha GP-100A printer, many books, games and disks, £250. Dunstable 602396.

DRAGON TRANSFORMERS, 32K £15, 64K £20, p&p £2; 74LS783 £9, MC6809E £3, 2764 £2, 4164 £1.25, BC337 £4/100, 3.579545MHz crystals 95p. Dragon 32 computers complete, for spares £35 + p&p. Could be working! Single pieces and other items SAE for details. Phone Nick 089244070.

SUPA-ART designer program, six options. Bring out the artists in your family. Tandy-color, Dragon 32. £2.99

Here's my classified ad.

(Please write your copy in capital letters on the lines below.)

£0.20	£0.40	£0.60	£0.80
£1.00	£1.20	£1.40	£1.60
£1.80	£2.00	£2.20	£2.40
£2.60	£2.80	£3.00	£3.20
£3.40	£3.60	£3.80	£4.00
£4.20	£4.40	Please continue on a separate sheet of paper	

Name..

Address..

.... **Telephone**..............

Please cut out and send this form to: Classified Department, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP

Competition Corner

Answers to Competition Corner, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

Taking chances

IT HAS been said that in no other branch of mathematics is it so easy to blunder as in probability theory, a statement which bitter experience often bears out.

In fact, the probability that a certain event *will* occur is the number of favourable cases, divided by Total number of equally likely cases. Similarly, the probability that the event will *not* occur will be the number of unfavourable cases divided by Total number of equally likely cases.

For example, the probability of drawing at random, say, a diamond from a full pack will be $^{13}/_{52}$, or 0.25, and the probability against will be $^{39}/_{52}$, or 0.75. Note that the sum of these two probabilities is 1, so from the definitions a probability of 1 means certainty and a probability of 0 means impossibility.

Difficulty in calculating probability often occures when a number of factors are combined, and these fall into two main groups: i) The probability of *either* this *or* that occurring, or ii) The probability of *both* this *and* that occurring. To take the first instance, we have seen how the probability of drawing a diamond is assessed at .25. Suppose that we wish to calculate the probability of drawing *either* a diamond *or* a picture card. The temptation is to add the odds for drawing a diamond ($^1/_4$), to the odds for drawing a picture ($^3/_{13}$). This would give the total probability of 25/52, which would be incorrect! Here we have counted *twice* those cards that are both diamonds and pictures. What we need to find is the probability of drawing either a diamond, a club picture, a heart picture, and a space picture. This is given by: $^1/_4 + {}^3/_{52} + {}^3/_{52} + {}^3/_{52} = {}^{22}/_{52} = {}^{11}/_{26}$. To find the probability *against* simply subtract this value from 1.

The second of our main groups relates to cases where we wish to assess the probability that *both* this *and* that will occur. To take our card-drawing example we might wish to calculate the probability of drawing a card which is both a diamond and a picture. In this case we simply multiply the probability of picking a diamond ($^1/_4$) by the probability of picking a picture ($^3/_{13}$). The product, $^3/_{52}$, gives the answer that we would expect as there are three diamond picture cards in the pack of fifty-two cards. Once again, to find the probability against, simply subtract from 1.

In some problems it is easier to calculate the probability *against* an event, and subtract this from 1 to find the probability *for* the event. For example, if I throw six ordinary dice, what is the probability that I will throw at least one six? Since the probability *against* throwing a six with one dice is $^5/_6$, the probability against throwing a single six with six dice will be: $^5/_6 \times {}^5/_6 \times {}^5/_6 \times {}^5/_6 \times {}^5/_6 \times {}^5/_6$. This value to 3 decimal places works out at 0.334, and so the probability *for* throwing at least one six would be 1 minus 0.334, that is 0.666.

Before turning to this month's competition question, here is a little problem whose solution I shall give next month. It is a problem which is set in such a way as to mislead the solver in assessing the probabilities involved. You are invited by a friend to participate in a small bet. He shows you three boxes of identical appearance. In the first box are two red marbles, in the second box two white marbles, and in the third are one of each colour. The boxes are closed and are mixed up. You are then invited to choose one of the boxes, and without looking inside, remove one of the marbles. Suppose that it is red, your friend might say 'Obviously, the box that you have chosen is not the one containing the two white marbles so therefore it must be either the red/red or the red/white box. the remaining marble has an equal chance of being red or white. I propose to guess which colour it is, and offer you an even money bet on the outcome. If I am correct, I win. If I am wrong, I lose!' Would you be wise to accept the bet?



For this month's competition, as a demonstration in probabilities, I assembled a number of volunteers into a room and handed to each one of them a slip of paper. They were then asked to write down any year in the range 1 to 1986 inclusive. This was to be done secretly without consultation with the others present. The papers were then collected. I knew from the number of volunteers present that there was a slightly *less* that evens chance of any two numbers being the same, but that if I also wrote down a date and added it to the pile the probability would rise to a *better* than evens chance. In other words, the addition of one extra number would increase the probability of at least two dates coinciding from just under 0.5 to just over this value.

Can you say how many volunteers there were? As a clue, there are fewer than you might, at first sight, think!

Prize

For this month, we are offering 15 prizes of the newest game for the Dragon . . . from the newest software house: Beanstalker from Micro Vision. In this 60 screen arcade adventure, you must collect treasure in Giantland, avoiding such hazards as giant caterpillars, giant insects and man-sized birds. You've seen the pantomime, now play the game!

Rules

To win your own copy of Bean Stalker, all you have to do is put your brain into gear and work out the answer to this month's puzzle — showing how you solved it. But please don't send us cassettes containing your program — hard copies only.

Make sure that your name and address is clearly printed on your entry, and mark your envelope "April Competition" . . . or you might risk disqualification.

As a tie breaker, complete the following sentence in 10 words or less: "I want to visit Giantland because . . .". As usual, preference will be given to entries that make the editorial staff giggle.

January winners

The 20 lucky winners of the Melbourne House 'Enter the Dragon' cassettes are as follows: Mark Lister of Laycock, West Yorkshire, R. G. Woods of Ilford, Essex, Charles Daly of Windsor Hill, Co. Cork, Simon Aubury of Swindon, Wilts, G. R. Barber of Sutton Coldfield, West Midlands, P. D. Maddocks of Taplow, Berks, M. Clarkson of Chelmsford, Essex, Chris Jolly of Grove Park, London, K. Lightowler of Halifax, D. R. Sharples of Merseyside, Luis Martinez of San Sebastian, Spain, Stephen Hunter of Highfield, Southampton, E. A. Newman of Addlestone, Surrey, J. Taylor of Acklam, Middlesbrough, P. L. Bates of St Albans, Cayuela Simon of Blois, France, D. C. Faulkner of Maesycoed, Mid Glamorgan, Geoffrey Marshall of Belper, Derby, and J. J. Randell of Plumstead, London. Congratulations one and all.

Entries for the tie break ("1986 is the Year of the Dragon because . . .") included many references to St George — oblique and otherwise, but generally our favourite was E. A. Newman's, "because it will be a roaring one."

I hope he was referring to the hot summer we are all praying for!